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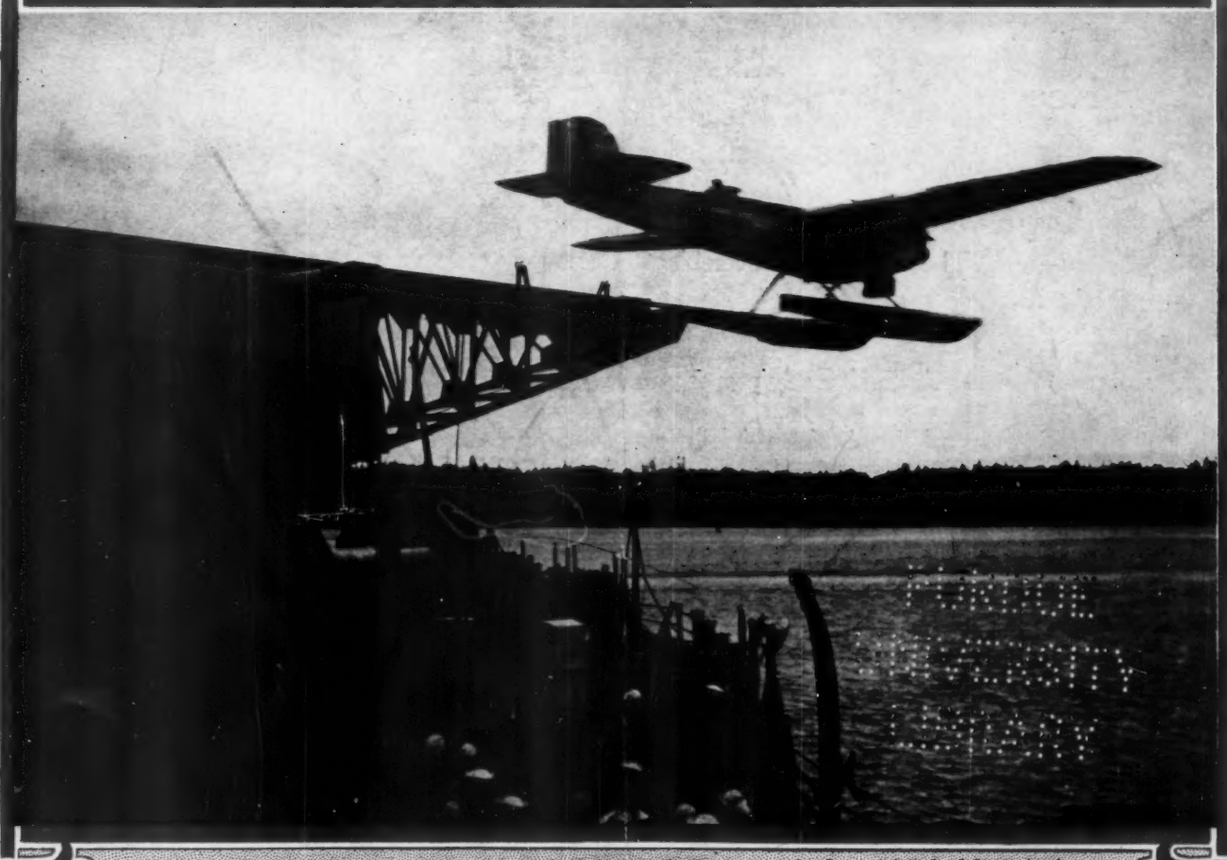

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VOLUME XVIII

NUMBER 1

SPECIAL FEATURES

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ARMY AIR SERVICE COSTS ONCE MORE AIRED

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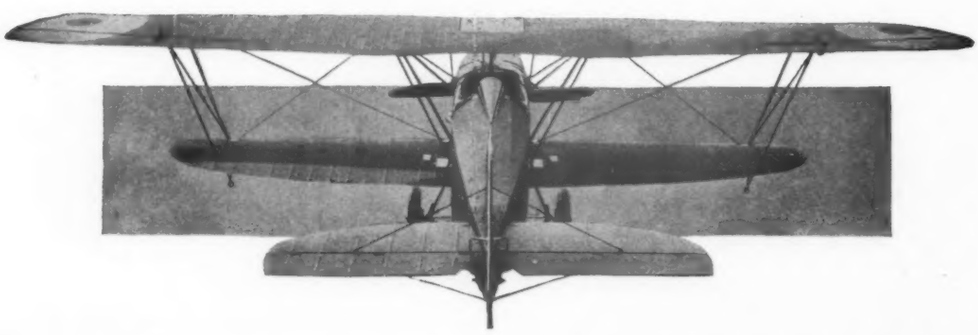

JANUARY 5, 1925

AVIATION

VOL. XVIII. NO. 1

Published every Monday

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VOL. XVIII JANUARY 5, 1925 No. 1

More Aviation Cost Figures

WHEN governmental officials charged with the expenditure of millions of dollars of public funds cannot render accurate statements, it indicates a carelessness or a lack of interest that deserves condemnation. AVIATION has felt that money appropriated for air activities of the government was being wasted through duplication and changes of plans or, to put it directly, because there is no governmental air policy.

The letter from the Secretary of War published elsewhere in this issue is a complete justification of the skepticism of AVIATION when considering figures purporting to show the "cost" of Aviation. While statistical tables and comment are dull and uninteresting to read, they are the only means that are known of reflecting ability of management, soundness of policy and results accomplished. Just because the people's money is being spent is no reason for less accurate accounting than in any business concern.

Whatever the objections to unified control of our governmental air activities may be, no greater argument has ever been made for such a supervision than the evasions, errors and incompleteness in the presentation to Congress of aviation accounting. It is not for AVIATION to place the blame, for it is convinced that no one official is to blame. It is the system that should be criticized. If individuals have taken advantage of this situation to minimize the great sums expended for aviation, it has been through fear that our air defenses would be crippled. But this does not excuse error after error being made, especially when the figures apply to a fiscal year the accounts of which have been closed for over a year.

In this connection, it is proper to say that the Army has been franker than the Navy in respect to figures. Repeated requests to the Navy have met with no response. The Secretary of War did make an investigation and when errors were found admitted them. The Navy has pursued a policy of silence that is not proper nor in keeping with the fundamental principle that the public is entitled to know what it is receiving for its money. It is to be hoped that AVIATION will receive from the Navy similar figures to those published by the Army. Then and then only can results be checked with costs.

We urge everyone interested in the future of aviation to study with great care the final accounting of Air Service expenditures. They should form a basis for serious thought as to the future of aviation in the United States.

Automatic Steering

IT is reported that a French engineer, M. Mazade, has further perfected the Aveline Stabilizer, and that this apparatus is being installed in several commercial air transports as well is in military bombers. The operation of this stabilizer is of the simplest. Once in the air the pilot is relieved of all the difficulties of steering the plane, for the automatic pilot takes hold of the situation and keeps the plane on a straight course. The pilot can then turn his attention to navigating. If he finds that the wind is shifting him from his course, he merely presses a button marked "right" or "left," as the case may be, and the machine turns automatically. To rise, he presses a button marked "up" and keeps it down until he has gained the altitude desired. It sounds as simple as riding in a push button elevator.

Reports as to the success of this appliance may be somewhat exaggerated, but automatic steering while in the air is theoretically possible and it is only a question of working the problem out in practical form. In marine work "Metal Mike" is taking the place of the helmsman and steers a more accurate and therefore more economical, course. Anyone who has ever steered a ship in a heavy sea realizes that the variation of course is even greater than in air travel and just as irregular. The aeronautical problem is more complicated due to the three directions of control and the effect of variations of speed, but for these very reasons an automatic pilot would render a greater service for air travel.

The automatic pilot will not help in taking off or landing any more than it will steer a ship into a dock, but it will be a great relief to the pilot while in the air, especially at night or when flying through clouds. In particular, it will enable him to concentrate his full attention to navigating his plane and keeping on the correct course. On the large airliner of the future it will save the cost of a navigating officer and will allow of longer flights without fatigue of the pilot. This valuable development of the aeronautical science has received little attention on this side of the Atlantic and it is hoped that the French developments will stimulate interest in this subject.

Pensions for Air Mail Pilots

THE death of Clarence O. Gilbert, an Air Mail pilot on night flying duty, brings acutely to mind the fact that our Air Mail pilots are not adequately provided with pension protection. The heroic manner in which Gilbert attempted to push through a blinding snowstorm because "The Mails must fly" and died in the attempt, is related elsewhere in this issue. The story of his untimely death should arouse a general desire to see the pilots of the Air Mail Service placed on the same footing in the matter of pensions as our Army and Navy pilots.

The Air Mail is such a new undertaking that all of the legal machinery which it should possess has not been developed to the point it has reached in the other Government Flying Services. Now that the Air Mail pilots' daily—and nightly—devotion to duty has so poignantly been brought to the attention of the public, an energetic effort should be made to provide through legislation some proper pension protection for those who risk their lives in "civil line of duty."

Army Air Service Costs Once More Aired

Error after Error Corrected and $10,389,811 Added. Total for 1923 now $36,341,276.92

The investigation which AVIATION has been conducting into the cost of aviation to the government has brought from the Secretary of War one of the most significant letters on the subject of costs that has ever been written. It is in reply to a letter written by AVIATION on July 29, 1924, questioning certain figures given by General Patrick to the House Appropriations Committee and subsequent revisions. The admission of error after error justifies the skepticism with which the figures were received. In fairness to General Patrick, it should be stated that the corrections, except in one very important particular, concerned errors made by other departments than the Air Service.

Discovery of Ten Millions

The great change contained in this new information is the increase of $10,389,811 by the inclusion of the cost of such supplies as Liberty engines that were paid for during the War. These supplies do, however, represent cost, and as the Navy included an almost equal amount in its figures it seems proper that the Army cost should also indicate a similar charge. General Patrick was specifically asked by the Committee: "Have you any figures which will show what the total cost of the Air Service has been for the last fiscal year?" It should be noted that "cost" was asked for, and not expenditures from appropriations. General Patrick said he thought that naval "appropriations" were greater than military. He was then asked: "If you have any means of getting the figure, I wish you would put a statement in the record showing the total amount expended for the Navy Air Service and for the Army Air Service for the last year." Mr. Anthony of the Committee specifically asked that General Patrick separate "the amount of surplus property used." It will be seen that three different words are used: "cost," "appropriations" and "expenditures."

The table included in the hearings gave the figure $28,144,-131.97, as the "cost of the Army Air Service, fiscal year 1923." AVIATION questioned this figure owing to the omission of the cost of surplus war material that was specifically asked for, and which item made the Navy costs appear higher than those of the Army. In reply to our questioning this figure, Assistant Secretary of War Davis sent us "later and more accurate data for the same year." This also was headed "cost." It showed an error of $5,786,502.70 and reduced the "cost" to $22,357,629.37 (AVIATION, p. 861, Aug. 11, 1924). But the cost of surplus engines, DH's and other supplies were not included.

How Cost Figures Vary

At this point the public was given the impression that the cost of the two Services was as follows:

Naval Air Service	$34,759,807.01
Army Air Service	22,357,629.37

Believing that this gave a false impression, AVIATION asked the War Department eight specific questions, and after five months of investigation, correcting of errors and making of changes, a new set of figures are now presented which presents the comparative costs as follows:

Naval Air Service	$34,759,807.01
Army Air Service	36,341,276.92

In the latter figure is included the cost of surplus material given by General Patrick in reply to our question No. 2.

AVIATION stated (Aug. 11, 1924) that there was an error of $6,000,000 in the statement made by General Patrick to Congress, but the answer to our request as to how this error occurred reveals the astonishing fact that the Quartermaster Department had again made an error of three and a half million dollars. In other words, more than half of the "lost" $6,000,000 had been found. AVIATION believed that the lumping of items under the heading "Procurement for Issue" of $4,467,732.01 should be more explicit. This information is supplied in answer to Question 6.

Under the general heading of "Experimental and research work" was a lump sum of $2,927,160.72. An itemization of this figure shows that $1,828,353.34 was spent for the pay of civilian personnel. But the most curious item to be included under such a head is the payment to an inventor under the head "Christmas Patent" of $62,500. If this is for "experimental and research work" it seems a remarkable extension of the terms.

Equally interesting is the confirmation of the fact that in the fiscal year 1924 only $141,904 was spent for new engines. This indicates a lack of coordination in production flow somewhere.

Letter from Secretary Weeks

The letter of the Secretary of War indicates how carelessly the costs of our Air Services to our government have been handled heretofore. It has been the purpose of AVIATION, in continuing this investigation, to bring out the point that no one in the government knew exactly what our aviation was costing, that there were no accurate figures available for the public, and that those interested were entitled to a clear itemized statement of the huge sums being expended for our air services so that results could be compared with costs.

There follow three statements: first, the letter from Secretary Weeks; second the answers to the eight questions asked by AVIATION, and third, a table giving detailed explanations of all errors and changes:

WAR DEPARTMENT
WASHINGTON, D. C.

Mr. Lester D. Gardner, President,
The Gardner, Moffat Company, Inc.,
225 Fourth Avenue,
New York City.

Dear Mr. Gardner:

Your letter of July 29, 1924 to the Honorable D. F. Davis, Assistant Secretary of War, requesting information regarding certain differences between statements furnished you concerning Air Service expenditures, and asking for fuller details of same, was forwarded to the Chief of Finance with directions to make a complete answer to same. In order to do this it was necessary for him to make a detailed examination of vouchers, hence the delay in making reply.

The results of his investigation appear on the attached table showing the two statements furnished you, their differences, with brief explanatory remarks, and the final and revised statement for the fiscal year 1923. There are also attached hereto the answers to your numbered questions.

It will be seen that the statement sent you on July 28 concerning 1923 was erroneous in that it did not include all of the items shown in the first statement. This was due to a misunderstanding as to what items should be included. In correcting this, the first statement, which was an estimate, has also been corrected, the final result appearing on the table under the heading "Revised Statement."

Regretting the necessary delay, but trusting that the information given will be satisfactory, I remain

Yours very truly,
JOHN W. WEEKS
Secretary of War

Enclosure

The following information is in reply to the numbered questions in your letter of July 29, 1924:

Question 1. **The Navy (p. 525 App. Comm. Hearings, Navy Dept. 1925) gives about $990,000 for Provisions for the Bureau of Aeronautics in 1923. Does the figure in your tables for 1923 for Quartermaster of $502,066.74 cover the same general items?**

Answer. **No. The corresponding figure for Army Aviation in 1923 is included in the amount reported under "Quartermaster Corps" in my letter to you on June 14 and also appears in the accompanying table in**

TABULATION SHOWING STATEMENTS FURNISHED, THEIR DIFFERENCES WITH EXPLANATORY REMARKS AND A REVISED STATEMENT

Item	First Statement June 14, 1924	Second Statement July 28, 1924	Increase or Decrease of Second Statement Over First	Explanatory Remarks	Revised Statement (Approximately Correct)
1. Air Service	$ 12,648,357.41	$ 12,648,357.41	$ -		$ 12,648,357.41
2. Salaries, Office Chief of Air Service	195,000.00	218,949.15	+ 23,949.15	This difference is due to the amount for "increased compensation" being included in the second statement and not in the first.	218,949.15
3. Signal Corps	162,000.00	162,000.00	-		162,000.00
4. Medical Department	87,749.18	70,188.72	- 17,560.46	The difference in this case is caused by an error in omitting from the second statement two items, totalling $19,072.55 viz: - Costs at stations other than Flying Fields $ 16,296.36; Cost to Appropriation "Hospital Care, Canal Zone Garrisons" 2,776.19. The first statement which was an estimate, also omitted small sums totalling $1,512.09. The revised statement is shown.	89,861.27
5. Ordnance Department	507,894.00	667,854.00	+ 159,960.00	The second statement carefully compiled by the Ordnance Department shows that the following items were omitted from the first, which was only an estimate:- For manufacture and experimental work of machine guns, accessories, etc. increased by $107,871.00; Storage and issue (omitted) 28,584.00; Transportation Air Service property, etc. (omitted) 16,430.00; Fuel and gasoline (omitted) 2,378.00; Maintenance of Flying Fields increased by 5,505.00; $159,960.00	667,854.00
6. Quartermaster Corps	4,041,938.00	502,066.74	- 3,539,871.26	An error was made in this item. The first statement, an estimate, was fairly accurate, and should not have been changed; there were omitted from it, however, two items amounting to $33,716.66 viz:- Buildings and Facilities at Aviation Stations, etc. $ 33,529.26; Military Post Exchanges 187.40. The second statement is also in error in that it only shows expenditures from Quartermaster Appropriations for the exclusive use of the Air Service and does not include the pro rata share of the Air Service from other Quartermaster Appropriations. The revised statement is shown.	4,075,654.66
7. Pay of the Army	10,459,715.00	7,985,424.60	- 2,474,290.40	In explaining this difference it should be stated that costs of pay of the army are not kept by branches, and that the figures in the first statement were a hurriedly prepared estimate in response to a request from the Congressional Committee. There is no record to show how those figures were arrived at. The second statement was carefully computed, based on detailed strength reports of the Air Service and is therefore as nearly accurate as an estimate can be made.	7,985,424.60
8. Mileage	41,478.38	33,206.00	- 8,272.38	The difference arose in this case through reporting in the first statement the amount allotted to the Air Service and in the second statement the amount obligated. The records now show the actual expenditures to be $34,382.08, the sum shown in the revised Statement.	34,382.08
9. Chemical Warfare Service		8,604.00	+ 8,604.00	These figures were not received in time to be included in the first statement which was prepared for the Committee Hearings. They should have been included and are now shown.	8,604.00
10. Engineers		60,978.75	+ 60,978.75	In reply to a request for data for the first statement, nothing was furnished as chargeable to Engineer Appropriations. This was possibly due to a misunderstanding as to what was required, as the only items listed were procurements by the Engineers from Air Service Appropriations, which had already been included in the Air Service report. The error was corrected in the second statement and now includes cost of supplies furnished from Engineer Appropriation.	60,978.75
Totals	$ 28,144,131.97	$ 22,357,629.37	$ - 5,786,502.60		$ 25,951,465.92

First Statement (Estimated)	$28,144,131.97
Revised Statement (Computed)	$25,951,465.92
Difference	$ 2,192,666.05

the column headed "Correct Statement," the specific amount being $1,137,291.00. This item appears in answer to question 3 (post).

Question 2. The Navy (ibid) includes $10,724,297 as surplus war material used in 1923. How is this item included in your 1923 figures? If not, what was the value of surplus war material used?

Note. General Patrick in his article in *Current History Magazine* dealing with the cost of War Aviation *deducted* the value of the supplies on hand such as Liberty engines and made public the figures with the statement that the supplies on hand were assets. If they are deducted from war cost, they should be included in present costs as is done by the Navy. Otherwise, a false impression will be given the public.

Answer. The following reply of the Chief of Air Service to this question is quoted:

"The figures appearing in the statement inserted in page 903 of the hearings on War Department Appropriations Bill for 1925, conducted by the House Appropriations Subcommittee, gave the cost of the Army Air Service for the fiscal year 1923 from current appropriations and do not include the value of surplus war material issued. The value of surplus war material issued in fiscal year 1923 is approximately $10,389,811. The unit prices used in computing this figure have been derived from war contract costs. All of the war surplus airplanes and motors issued had to be reworked in varying degrees and the cost of such work is reflected in the figures given for the expenditures under the current appropriations for the fiscal year 1923.

Question 3. What were the costs included in General Patrick's figures for the Quartermaster Corps of $4,041,000 and left out in the latter tables making the figures $502,066.74?

Answer. The following tabulation shows the difference between the two statements:—

Item	*Gen. Patrick's Statement sent to you June 14, 1924*	*Second Statement sent to you July 28, 1924*
Subsistence of the Army	$1,137,291.00	
Regular Supplies	770,824.00	$139,892.33
Clothing and Equipage	213,726.00	710.00
Incidental Expenses	291,623.00	24.00
Army Transportation	1,140,971.00	255,566.85
Water and Sewers	128,843.00	13,815.95
Barracks and Quarters	226,693.00	49,937.60
Barracks and Quarters, Philippine Islands	15,810.00	
Roads, Walks, Wharves and Drainage	33,895.00	7,831.08
Shooting Galleries and Ranges	1,678.00	
Construction and Repair of Hospitals	35,906.00	572.27
Increased Compensation	44,678.00	
Buildings and Facilities of Aviation Stations, etc., Army		33,529.26
Military Post Exchanges		187.40
TOTALS	$4,041,938.00	$502,066.74

See also Item 6 with explanatory remarks and revised statement on accompanying table.

Question 4. What reduced the pay of the Army item $10,459,000 to $7,985,424.60?

Answer. See Item 7 with explanatory remarks on accompanying table.

Question 5. On page 952 (ibid) General Patrick testified that $400,000 was expended for helium in 1923 and $500,000 in 1924. Under what heading is this included in the recent tables?

Answer. These amounts are included respectively in the amounts of $727,359.15 and $867,071.18 under heading "Supplies" in the table referred to which was the second inclosure to letter of July 28, 1924.

Question 6. In 1924 $4,467,732.01 is under "procurement for issue." $3,360,261.08 is listed for aircraft. Can we have a further itemization of the difference?

Answer. This difference is analyzed by the Chief of Air Service as follows:

Under Procurement for Issue in 1924, $3,360,261.08 is listed for aircraft out of a total expended of $4,467,732.01. The difference of $1,107,470.93 is made up of the following amounts:

Corps of Engineers	$6,211.88	
Chemical Warfare Service	5,866.82	
Air Service:		
Airplanes, repair and alteration of	$707,932.04	
Airships and balloons, repair and alteration of	47,148.50	
Engines, repair and alteration of	187,650.15	
Instruments and accessories, repair and alteration of	53,989.52	
Hangars, repair and alteration	91,365.63	
Minor items	7,306.39	$1,095,392.23
		$1,107,470.93

Question 7. $2,927,160.72 is given under "Experimental and Research." May we have an itemized statement of the main expenditures under this head?

Answer. The following reply of the Chief of Air Service is quoted:

Itemized statement of the amount given under "Experimental and Research" as follows:

Medical Research	$ 7,310.59
Pay of Civilian Personnel	1,823,352.34
Travel of Civilian Personnel	23,000.00
Experimental and Research (Supplies, equipment, etc.)	988,537.87
Printing equipment	9,439.92
Christmas Patent	62,500.00
Transportation of supplies	520.00
License fees	12,500.00
	$2,927,160.72

Question 8. Was only $141,904 used for aircraft engines during 1924? If so, how is the cost of Liberty engines accounted for? As war cost or present cost?

Answer. The Chief of Air Service states that $141,904 was expended for new aircraft engines in fiscal year 1924. No contracts were let during the fiscal year 1924 for the reworking of war surplus engines. It should be further noted however, that the statement in question does not purport to give the cost of war materials utilized, inasmuch as it gives only actual expenditures of funds from the appropriations considered.

Rules for Airplane Structures

Rules for standardization of airplane controls, provisions for inspection and repair, factors of safety of structural parts, and precautions against fire and accident are embodied in the Airplane Structure sections of the American Aeronautical Safety Code, recently released by the Bureau of Standards.

This code covers all details of the design, construction, testing, and operation of aircraft and their landing facilities. It is being prepared under the auspices of the Society of Automotive Engineers and the Bureau of Standards, and the committee entrusted with its formulation is composed of experts from the various government departments, representatives of the aircraft industry, and others whose opinions are considered valuable.

In the sections of the code just released rules are given for the upholstering of passenger carrying airplanes to protect the passengers in case of a rough landing. A landing not rough enough to damage the airplane seriously might injure a passenger unless objects in the interior of the cabin were thus upholstered or made of wicker or similar resilient construction. The upper parts of the seat backs must be of smooth form and lightly upholstered or made of wicker or the like. Padding at least two inches thick is required around the edges of cockpits, and on the front where the head is likely to strike. The use of movable furniture in cabins is forbidden.

The use of fireproof partitions between the engine and the passenger cabin is considered essential, and it is recommended that fireproof materials be used wherever possible in the construction of the plane. Gasoline tanks should be placed where their leakage into the plane is unlikely, and should be at a distance from the engine. Provision should be made for quickly cutting off the gasoline supply in emergency. Exhaust pipes must be carried overboard.

Other safety provisions given in the code cover clearances of propellers, definite marking of the parts of the airplane which can be safely walked on or handled, and the provision of emergency exits in closed planes like the emergency door of a bus. All controls are required to operate in a definite standard way, so that a pilot flying a machine of a make different from the one he is accustomed to will not become confused.

Strength factors to be allowed in parts of the structure are given, and rules are given covering the practices considered best with the forms of construction in present use. Tests are provided that must be met by new forms of construction not covered by the present code.

U. S. Navy Plans 6,000,000 cu. ft. Airship

Admiral Moffett's Testimony Before Congress—Goodyear-Zeppelin Corporation Starts Working Plans for Smaller Ship

An airship of 6,000,000 cu. ft. capacity which would cost $1 per cubic foot to build has been designed by naval air experts, according to testimony given before the Naval Appropriations Subcommittee by Rear Admiral William A. Moffett, Chief of the Bureau of Naval Aeronautics.

The World's Biggest Airship

This airship would be the largest in the world, excelling each of the two 5,000,000 cu. ft. ships which have been ordered by the British Government for commercial use between England and Australia.

No funds have been asked from this Congress for the construction of the 6,000,000 cu. ft. airship. The design will be held in reserve until the Navy Department and Congress are ready. For the present, the policy of the department appears to be to get along during the coming fiscal year with the Shenandoah and Los Angeles in the training of crews and in gaining greater experience in the handling of large airships. The Los Angeles can only be used commercially, by agreement with Germany.

Admiral Moffett explained to the committee that the first experimental ship would cost a great deal more than subsequent craft. The Shenandoah cost $1.37 a cubic foot.

Comparative Airship Costs

"The British," Admiral Moffett said in reference to the two 5,000,000 cu. ft. ships proposed by them, "say they are going to build them at 25 cents a cubic foot. We do not believe they are going to do it, but they claim that that is what they are going to do."

"The reproduction of a ship, the plans of which have already been made and which has already been tested out through the building of the first one, would mean what?" Chairman Burton L. French asked.

"We think it would reduce the cost almost half," replied Admiral Moffett. "If we build four of these ships, it would cost us 50 cents a cubic foot."

Lieut. Comdr. L. T. Du Bose of the Bureau of Aeronautics told the committee that the estimated value of the Los Angeles, built in Germany, was about $1,000,000.

Proposed Airships Compared

Admiral Moffett furnished Chairman French with this comparison:

	Proposed American 6,000,000 ft. ship	*British 5,000,000 ft. ship (2 ordered)*
Gas volume, cubic feet	6,000,000	5,000,000
Length, feet	785	695
Diameter, feet	122	130
Inflation, gas	Helium	Hydrogen
Unit lift, pounds-feet	.064	.068
Gr. lift, 90% full, tons	154	137
Speed, maximum, knots	70	72
Speed, stand, knots	50	50
Horsepower, maximum	3,900	3,850
Horsepower, standard	1,560	1,430
Endurance at maximum speed—		
Hours	65.5	72.5
Nautical miles	4,590	5,220

The Shenandoah has a gas volume of 2,150,000 cu. ft., is 680 ft. long, 78.7 ft. in diameter, has a maximum speed of 54 knots, an endurance of 1,910 mi. at maximum speed and 2,300 mi. at standard speed.

The Los Angeles has a gas volume of 2,600,000 cu. ft., is 658 ft. long, 90.7 ft. in diameter, maximum speed of 67 knots, an endurance of 2,820 mi. at maximum and 4,525 mi. at standard speed.

Operating Costs of British Ships

With respect to the operating costs of the British 5,000,000 cu. ft. craft, using hydrogen, between England and Australia, Admiral Moffett submitted a British estimate showing that it would cost £888,000 a year to run a service employing two bases, with two intermediate mooring mast stations and five airships, of which the running cost of the ships alone would be £725,000.

The total annual milage of five such airships would be 1,000,000, the cost per mile being 17 shillings 6 pence. The available lift for freight would be 44 tons. At 50 per cent full load the cost per passenger mile would be 9.7 pence. Allowing six passengers per ton, the cost per passenger mile would be 1.61 pence at 50 per cent full load.

The British estimate that the capital for such a line of five airships would be £2,000,000, and allowing 2 pence per passenger mile and 50 per cent full load, the revenue per year would be $1,375,000, against an expenditure of £888,000, leaving a profit of $212,000, or 10.6 per cent.

The fare from London to Bombay would be 2½ cents a mile, or £52, and the number of passengers to be carried each way annually between England and India is estimated as 13,221. No allowance for mails was made.

A North Atlantic Service

"The average economical speed of a commercial airship," Admiral Moffett informed the committee, "is estimated at 50 knots. The Los Angeles, inflated with helium, can cover at this speed 3,000 naut. mi., or approximately the distance from New York to London, without refueling with a commercial or pay load of 6.4 tons, but without any reserve fuel for adverse winds.

"On the eastward trip favoring winds can usually be counted upon. To ensure safety, mooring masts should be provided in Newfoundland and Ireland, which would reduce the longest necessary nonstop flight of the voyage to about 2,000 mi. and allow a fuel reserve of 50 per cent for the rare contingency of adverse winds on the eastward voyage.

"On the westward voyage the southern route, via the Azores and Bemuda, would usually be followed in order to take advantage of the favoring trade winds, and mooring mast bases in those islands would again reduce the longest necessary non-stop flight without refueling to less than 2,000 mi."

New York—Havana—Panama

Admiral Moffett testified that an alternative to the New York-London route would be New York-Panama, a distance of 1,840 naut. mi. He said that could easily be a non-stop flight and that a mast at Havana would afford refuge from West Indian hurricanes.

The Admiral estimated the yearly operating costs of the Los Angeles on the basis of 160,000 mi. annually, equivalent to eighty trips between New York and Panama, as $763,000, of which $117,000 would be for the crew, $240,000 for helium, $300,000 for depreciation and maintenance and $106,000 for fuel. He said that eighty trips a year would equal approximately $9,500 a trip, and that adding 50 per cent for base charges would make the cost per trip between New York and Panama $14,300, and between New York and London $21,400.

He went into the possible revenues per trip on these two routes, assuming a 100 per cent full load factor, that might be derived from such a use of the Los Angeles. The estimate for a New York-London trip was as follows:

Sees 5 per cent Profit a Year

Twenty passengers at $1,000 each, $20,000; 2.4 tons of mail and packages, $4,300; total receipts, $24,300; less costs, $21,400; net profit, $2,900.

Assuming fifty-two trips a year, he said the yearly profit was estimated at $151,000, or 5 per cent, on the $3,000,000 investment, representing the ship and a reasonable share of the base costs.

"A similar yearly profit," said Admiral Moffett, "may be

expected on the shorter New York-Panama route with eighty trips. • • •

"To maintain a satisfactory service on either route three airships should be employed, allowing for two being in the air, one going in each direction, and a third in reserve."

Admiral Moffett figured that the proposed ship of 6,000,000 cu. ft. would carry eighty passengers and twenty-two tons of pay load on each of forty round trips a year between New York and London. He thinks the net profit would be $60,700 each way, or $4,856,000 a year for eighty full voyages.

Proposed 5,000,000 cu. ft. Goodyear Ship

In connection with the information furnished the Naval Appropriations Subcommittee by Admiral Moffett, particular attention attaches to the 5,000,000 cu. ft. projected by the Goodyear-Zeppelin Corp. of Akron, Ohio. Working plans for this airship were started with the recent arrival in Akron of Dr. Karl Arnstein, formerly chief engineer of the German Zeppelin company, and a selected staff of twelve technical men from Friedrichshafen, Germany, the former home of Zeppelin operations. Dr. Arnstein, under whose direction nearly 100 Zeppelins, including the Los Angeles, were constructed in Germany, holds a similar capacity with The Goodyear-Zeppelin Corp., a subsidiary of The Goodyear Tire & Rubber Co.

P. W. Litchfield, vice president and general manager of the Goodyear Zeppelin Corp. has authorized the following statement regarding the 5,000,000 cu. ft. projected by his company.

Statement by P. W. Litchfield

"Before entering into any discussion of the design problems involved in building a rigid airship of 5,000,000 cu. ft. or more, it might be well to answer the question of why we have started plans on a ship of this size at all.

"The Shenandoah with a capacity of 2,115,000 cu. ft. of gas is able, with a few intermediate stops for fuel, to make a 9000 mi. journey around the rim of the nation and back. The ZR3, or Los Angeles, flew from mid Europe across the Atlantic to Lakehurst, N. J. for delivery to the United States Navy, a journey of more than 5000 mi., the longest non-stop trip ever made by any vehicle created by man.

"Why should we not be content with this for the present and proceed toward the solution of whatever operating difficulties there are in the way of a ship of this size rather than to take up the project of a ship twice as large?

"The most important consideration is that the airship reaches its highest efficiency in the larger units. The larger the airship is, the higher is the proportion of useful lift (freight carrying capacity) in comparison to size. The earliest airships built by Count Zeppelin could carry only from 10 to 20 per cent of their weight in freight or passengers. The ZR3 carries between 50 and 60 per cent.

What Larger Ships Could Do

"Stated another way, the ZR3 inflated with gas and under normal temperature and pressure conditions weighed when empty about 45 tons, but it was able to lift a total weight of some 90 tons, this being distributed between the large amount of fuel needed for a long non-stop flight, oil and water, crew and so on. The ZR3 started from Friedrichshafen with 29 tons of gasoline for fuel. A little less than 22 tons was actually used on the 5000 mi. journey.

"A ship twice the size of the ZR3 would not require twice the amount of fuel or twice as large a crew, and would have a considerably larger percentage of space for passenger or mail or express matter. A ten million cubic foot ship could carry a proportionately greater pay load than a five million cubic foot ship, and could fly around the world in a non-stop flight,—could fly it either way indeed — around the equator or around the poles. However, it is logical to start first in the intermediate size of a five to six million cu. ft. ship and learn what problems are involved there before going to the next step.

"In undertaking the design of a ship, there are various considerations that must be taken into account. Whether the first requirements of America would be for a military or commercial ship is a primary factor, involving many variations in design. If the ship is a commercial ship built for speed, then something can be sacrificed in the pay load it may carry. If it is to be built primarily for transport and the matter of 10 or 15 mi./hr. difference in the rated speed of the engines is not important, the engineers must include that fact in their computations. If the ship is designed for travel over the land, let us say between the two oceans, the altitude to be reached, the ceiling of the ship is an important factor.

"For the ship starting on its return journey from Los Angeles, with fuel to carry it to New York, must carry this maximum weight over the Rockey Mountains, and in the higher altitudes the air pressure is less and the tmperature is lower, both factors affecting the lifting power of the gas. If the ship is designed for coast patrol with the fleet, making comparatively short but fast scouting trips, it will have different requirements from a ship that is to carry passengers and mail and express across the Atlantic Ocean without opportunity for refuelling enroute. The routes to be followed and the tasks to be done by a Zeppelin ship are primary facts to be studied before the final lines of design can be settled.

Approximate Features of Proposed Ship

"However, it is possible to set down in approximate figures at least the general limitations somewhere within which the proposed ship will find itself. Let us set the capacity of the gas bags as being between five and six million cubic feet.

"The Shenandoah is 680 ft. long and 78 ft. in diameter. The ZR3, or Los Angeles, somewhat shorter and fatter, is 660 ft. long with a height of 101.6 ft. This gives a ratio of slenderness for the Shenandoah of 8.7, that is 8.7 times as long as it is in diameter. The ZR3 ratio is about 7.2. The proposed five million cu. ft. ship may be between 860 and 930 ft. long, the maximum diameter 115 to 120 ft., with the overall height from the ground, that is with the control car, 10 ft. higher, and with a slenderness ratio of around 7.5.

"Let us set down the engines necessary to drive this big ship at 4000 hp. as against 1,500 hp. of the Shenandoah and 2000 hp. of the ZR3. With the engines of this size a ship should develop a speed of 80 to 85 mi./hr., and driven at a maximum speed with a full fuel reserve and passengers, freight and express, should have no difficulty in making a 6000 mi. non-stop flight. If driven at a cruising speed of 75 mi./hr., it could go, roughly 8000 mi. or one third of the distance around the world without stopping. As to the pay load, it might carry from 50 to 125 passengers, three to six tons of mail and up to 12 tons of freight over this 6000 to 8000 mi. journey.

"If this ship is designed for overseas transport as a commercial ship, supplementing the steamship service by giving two-day service between New York and London for that class of passengers to whom time is important and who would make many more trips a year if they could, it could make the round trip to Europe and back in a week or ten days. We may visualize a passenger cabin, extending along the keel of the vessel with a promenade deck and steamer chairs, comfortable berths, dining room service, shower baths and the like, furnishing a pleasant and easy journey, without seasickness or other discomforts of present methods of travel.

Operating Costs Problematical

"Many inquiries have been made as to what the fare might be. Thousands of flights were made by Zeppelin ships across Europe before the war and for three or four months after the war until operations were stopped by the Inter Allied Control Commission, and in this time some 35,000 passengers were carried without accident or mishap. The Bodensee made regular trips from the Swiss border to Berlin and occasionally to Stockholm after the war in all kinds of weather, meeting schedules, and doing this at approximately going rates for transport by train. However, I don't think that anybody is in a position yet to discuss the matter of cost of airship travel because the operating experience has been too limited to draw final conclusions.

"What may be said is that the Zeppelin ships offer a new and faster method of long distance transport, and that interesting developments are ahead. America is now able to draw upon the accumulated experience of twenty-five years

of the Zeppelin organization in construction and operation of airships. It has the added advantage of American factory methods of construction, of American enterprise and resources and temperament, plus the fact of a great continent and two great oceans to operate over without having to cross the borders of another nation. That there are certain problems to be solved, certain difficulties to be overcome is only added stimulus to America to proceed to gain for this country the fullest advantage of aeronautics in the way of commercial strength and national defense. Whatever problems there are can be solved if we take advantage of the exceptional opportunity this country has, and if we face these problems with courage and faith and determination.

"Officers of the Goodyear Tire & Rubber Co. which took over Zeppelin rights for North America, will serve the new subsidiary, the Goodyear Zeppelin Corp., including E. G. Wilmer, chairman, and G. M. Stadelman, president. E. A. Lehman, formerly of the Zeppelin company at Friedrichshafen, and first officer of the ZR3 in its trans-Atlantic flight, and Dr. Karl Arnstein, chief engineer of the original Zeppelin company, and builder of the ZR3 and of some 100 Zeppelin ships, will act as vice presidents of the American company. Dr. Hugo Eckener, head of the Zeppelin plant and commander of the ZR3 on its delivery flight, will be a member of the board of directors for Goodyear-Zeppelin. The presence of these three men is an assurance that the full resources and experience of successful Zeppelin operation will be at America's disposal."

General Pershing on Air Power

General Pershing's final report as Chief of Staff to the Secretary of War is in the usual form of asking for a larger Army Air Service, but depreciating the possibilities of aircraft as an independent arm. In many ways, General Pershing's low opinion of the value of aircraft has been one of the greatest obstacles that the Air Service has had to overcome. His view is one evidently warped by his war time experiences with inadequate and primitive aircraft equipment.

The attitude of our only General at the bombing of the battleships was that of an observer who desired to see the experiments from the Army and Navy viewpoints rather than from that of an unbiased observer. In fact; it can be said with full knowledge of the facts that the Navy practically dictated the opinion that was sent out to the world as coming from General Pershing. Those who know how reports of this kind are prepared usually seek the source of the inspiration.

In his latest disparaging remarks about the possibilities of the aerial arm, the antiquated views of military and naval experts are well reflected. It will be a relief when we have less prejudiced opinions from those charged with our national defense.

General Pershing's remarks on the Air Service are as follows:

Our War Experience

"Our experience in the World War as to airplane production and the training of personnel should be continuously borne in mind by all who appreciate the role of aviation in modern warfare. Early in 1917, it will be recalled, an appropriation of $600,000,000 was hastily made with what seemed to be an effort to overcome previous inexcusable neglect to make provision even for experimental investigation, to say nothing of preparation for manufacture of airplanes. The voice of criticism for previous inaction was apparently stilled, for the time being, by the loudly heralded purposes to send 50,000 airplanes to the Western Front without delay—a declaration that later brought many an embarrassing moment to those of us abroad who knew how baseless and boastful such claims were. It is a matter of record that even the type of plane to be put in production was not decided upon until several months after we entered the war, and that no American plane was flown in battle until August 1918, and only some 600 planes had been sent to the front before the Armistice.

"The Air Service has become an essential aid to the armies in the field, especially because of its ability to observe and obtain valuable information as to the immediate enemy battle front. It is now possible for observers to direct the fire of our artillery from the air, and thus aviation has risen to very great importance as an auxiliary arm. But satisfactory results cannot be obtained without the closest cooperation with the ground troops. This class of training demands particular attention, not only to perfect personnel and mechanism for accurate observation, but to work out simpler methods of inter-communication and establish more effectively that mutual confidence between ground and air without which attempts at teamwork must certainly fail.

"Enthusiasts often forget the obligations of military aviation to other troops, and sometimes credit that service with ability to achieve results in war that have not received practical demonstration. Take, for example, the bombing tests last year in the Chesapeake. The maneuver showed that under the most favorable circumstances bombs of destructive size could be dropped with considerable precision. In these exercises, the vessel was at anchor in quiet waters; there was no opposing aviation, nor was there any anti-aircraft used against the bombing planes. Conclusions, from such trials, that aviation can take the place of either seacoast or battle fleet protection do not seem to be altogether warranted. Improvements in the accuracy of anti-aircraft artillery appear to be keeping pace with improvements in aviation. Our own experiments against airplanes show that to avoid the danger of destruction they must fly at such a height as to eliminate the probability of accurate firing, and this would especially apply to bombing planes which have a limit as to altitude.

Bombing Damage in War

"During the World War extravagant tales of havoc done to enemy cities and installations were often brought back, in good faith, no doubt, by some of our aviators, but investigation after the Armistice failed, in the majority of cases, to verify the correctness of such reports. Again, the damage done to the Allies by the enemy's bombing craft, including Zeppelins, was almost negligible even from a material point of view, certainly so from a morale point of view and in its effect upon the final results. Of course, some damage was done by aircraft bombing, and it would doubtless be somewhat greater in another war, but until it becomes vastly more probable than at present demonstrated, then it cannot be said that we are in position to abandon past experience in warfare.

"This brings up claims as to poison gases, and how whole populations can be wiped out, according to some theorists, by dopping gas bombs. The same reasoning exactly applies in this case. Moreover, I am not ready to concede that such inhumane destruction of non-combatants would be undertaken by any civilized nation, even though possible. Its use against troops, though horrible enough, was not, after the first gas attack, so destructive on either side as is generally believed. Here the counter development of the gas mask served as time went on to diminish the number of casualties.

"We are therefore logically forced back to the conclusion that armies must still fight our battles—and to win must overcome the opposing forces. The infantry still remains the backbone of the attack and the role of other arms is to help it reach the enemy. All must work in cooperation to that end. The idea that the principles of warfare have changed and that armed contests will be settled in any other way have nothing substantial in our experience to warrant serious consideration.

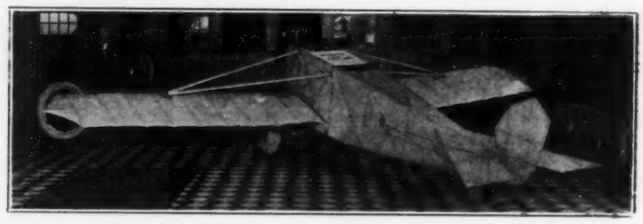
The Orthodox Attitude

"The Air Service on land should remain an auxiliary arm and a very important one in our service, available as now for independent use in wars or otherwise wherever necessary, but always under the orders of the Commander-in-Chief of the Armies. Our Air Service should be developed to every reasonable extent both as to personnel and material, and it is especially necessary that aircraft production be established and maintained on such a basis as to be easily expanded in time of emergency. The relative production and types of Army and Navy aircraft would depend upon their respective needs as determined by the particular sphere of activity assigned to each under the decisions of the Joint Army and Navy Board, it being understood that there should be the fullest coordination in production matters with complete cooperation in the use of installations and combined action in operations at points of contact between the two services."

Universal Test Fuselage

An interesting experiment in full flight research is suggested by a Dayton man who recently built for this purpose a light plane fuselage with adjustable wings, which he calls the Universal Test Fuselage. The experimenter is Denis Cashman, 402 Edgewood Ave., Dayton, Ohio.

"Aeronautical engineers are agreed," writes Mr. Cashman, "that wind tunnel tests leave much to be desired and that



The Universal Test Fuselage developed by Denis Cashman of Dayton, Ohio

actual flight tests are the only sure measure of a ship's performance. The Universal Test Fuselage is the outcome of much study of the needs of the aeronautical designer and is an attempt to incorporate in one fuselage the means of testing various wing sections in every position so as to determine the best setting of the wing, namely the incidence, the dihedral or kathedral, sweepback or forward, etc. The changes from one extreme to the other are accomplished in not more than 30 min."

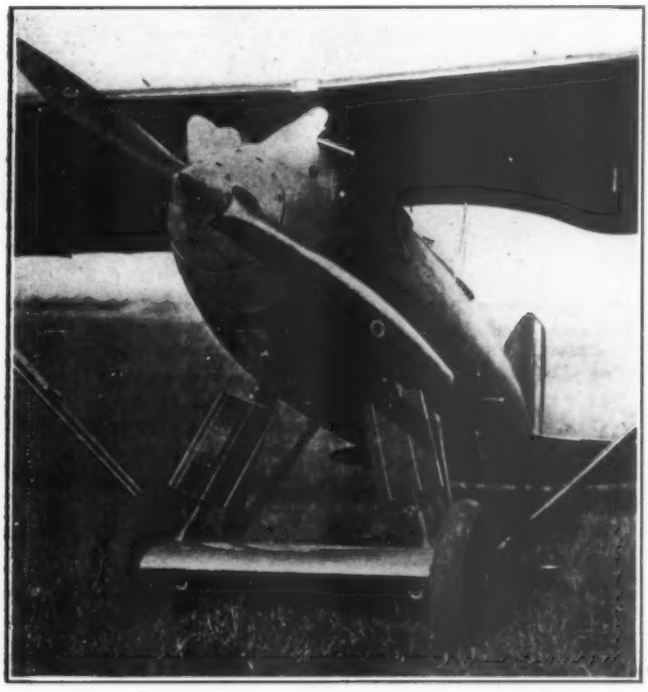
In the present machine, a 2 cylinder V type motorcycle engine is used, driving the propeller directly. The wings are mounted on a swivel joint at the front spar, and connected at the rear spar to the controls. Lateral control is obtained by this means, as in one of the German gliders of 1922.

Recent French Pursuit Airplanes Described

Preponderance of Duralumin Construction a Notable Feature

By LADISLAS D'ORCY

The pursuit airplanes which are described below from information appearing in the French aeronautical press will be found of particular interest in that they are all recent products of the French aircraft industry. Three of them, namely the Dewoitine D1, the Wibault-3 and the Bleriot-Spad 81 were produced in 1922 and 1923, to satisfy the requirements of the 1921 program in which the 300 hp. Hispano-Suiza engine was still considered as the standard power plant of French pursuit ships. While the performances of these three ships marked in several respects an improvement over that of the Nieuport-29, which is still the standard French pursuit equipment, the French air authorities felt that a much greater effort was required to keep their pursuit aviation abreast of foreign air forces. It was particularly desired to have greater carrying capacity, quicker rate of climb, higher service ceiling and greater speed at high altitudes. As these requirements were impossible to accomplish with the 300 hp. Hispano, it was decided early in 1923 to draw up a new pursuit program which would be based upon the higher powered engines a number of French manufactures were then beginning to develop upon the instances of the Technical Service of the French aviation service. To further spur on activities, the French Under-Secretary for Air announced that one million francs in cash prizes would be awarded in an engine competition to be held in 1924. This competition started last March and the tests are progressing very slowly, for at last accounts it was still in process. However, several of the engines entered in this competition have already become available for flying purposes, and they will be found mounted in the latest French pursuit planes, that is, those built to the 1923 program. These engines are the 450 hp. W type Hispano, the 450 hp. V type Hispano, the 450 hp. W type Lorraine-Dietrich, the 550 hp. radial Salmson and the 380 hp. Jupiter, built under Bristol license by the Gnome-Rhone company.



The nose and landing gear of the Nieuport type 42 (450 hp. Hispano) pursuit plane. Note the Lamblin radiators on the landing gear

The pursuit ships which were built around these power plants were presented by their constructors to the Technical Service last summer. It should be noted that this was not properly speaking a competition, for the airplane manufacturers were neither held down to set specifications nor did the French aviation service bind itself to accept a given machine under any condition. The whole procedure seems to have resulted from a more or less informal series of conversations in which the aviation service said to the manufacturers: "Such and such are our minimum requirements for the new pursuit ships. See how far you can improve them with these engines. We will test your ships statically and in flight, and if they should satisfy us as to their fitness, we will buy them and issue them experimentally to the pursuit squadrons. The findings of the pursuit pilots will largely govern our future course as to which of these ships, if any, will be ordered in quantities."

While this is not meant to be a *verbatim* record of what was actually said, it may be taken as representing substantially the attitude of the French aviation service in this question. The actual minimum requirements of the 1923 pursuit program have not been made public—for obvious reasons—but our readers will be able to judge for themselves from such data as are on hand as to how the French constructors endeavored to solve the problem.

Before dealing with the ships specially designed around the new engines of the 1923 program, there will be described below several experimental ships of the 1921 program, fitted with the 300 hp. Hispano, from which new types were developed for the later program.

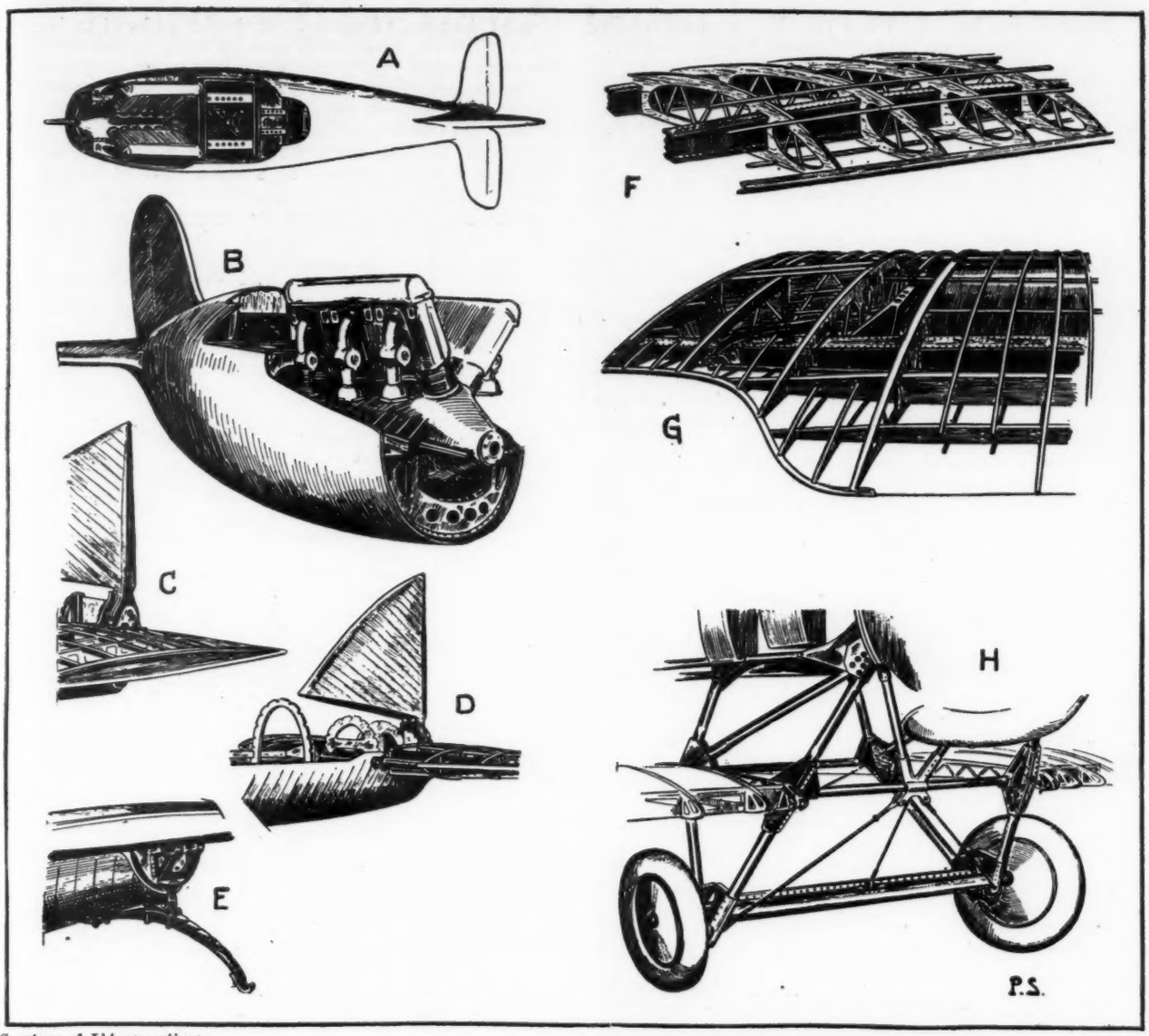
Nieuport-Delage 42 Pursuit Plane

The Nieuport-Delage 42 pursuit plane, with 450 hp. V type Hispano-Suiza engine, derives from the Beaumont Cup racer which was incidentally produced with a view to breaking the world speed records made by American pilots during and after the St. Louis air meet. Although Sadi Lecointe, who piloted this racer, failed to threaten seriously the world maximum speed record of 266.6 mi./hr. made by Lieut. A. J. Williams, U.S.N., on a Navy-Curtiss racer, the French pilot succeeded in making a new speed record for a 500 km. distance, averaging 190.1 mi./hr. The previous mark for this distance, made by the late Lieut. Alex. Pearson, A.S., on a Verville-Sperry racer with 350 hp. Wright engine, was 167.8 mi./hr.

As the Nieuport company has for many years now been the "speed king" of the French aircraft industry, it is to be expected that it will make further efforts to recapture the American held speed records. For this reason a few remarks on the Beaumont Cup racer of this firm, insofar as it differs from the Type 42 pursuit plane will be of interest.

Both ships are strut braced monoplanes and are characterized by very fine streamlining. But while the Beaumont Cup racer has a single panel wing, with wing radiators, which is attached flush to the top of the fuselage, the Model 42 pursuit plane has a raised wing, composed of two panels and mounted on an inverted Vee cabane. In both planes the axle of the landing gear is masked by an airfoil shaped fairing, but in the pursuit ship provision is further made for fixing on both sides of this airfoil small wings, fitted with flaps which answer the purpose of wind brakes. Besides, the struts which brace the wing to the landing gear are of the straight type on the racer, whereas on the pursuit ship they have the shape of a Y, the two branches of which are fixed to the wing beams. Finally, the pursuit plane has Lamblin strut type radiators, which are mounted on the front struts of the landing gear.

Otherwise the construction of the two planes is to all intents similar, and that of the fuselage is, in fact, identical, so that the particulars given below apply to both ships.



Courtesy of *L'Aeronautique*

Construction details of French pursuit planes—Nieuport 42: A, top view of fuselage; B. three-quarter front view of same, showing engine mounting; C, the fixed surfaces of the empennage; D, tail end of the fuselage, showing veneer bulkheads notched to take stringers; E, tail skid and main fitting of stabilizer; F, G, the wing structure; H, the landing gear of the Hanriot H31

The fuselage is a fabric covered plywood shell of elliptical cross section. This shell is built in two halves over a mold out of 0.9 mm. thick layers of tulip wood. Internally it is stiffened by a number of trapeze shaped longitudinal stringers, which are molded together with the skin, and by ring shaped bulkheads of plywood, as may be seen in one of the accompanying sketches. The forward portion, extending from the engine section to the pilot's seat is further reinforced by a duralumin structure composed of horizontal and vertical plates, and two duralumin bulkheads. The vertical plates serve in front as engine bearers, while at the rear they afford fixation points for the controls and of the pilot's seat. To the two metal bulkheads are attached, on top the cabane, and on the bottom the landing gear struts. The metal structure is bolted to the plywood shell, to which it gives a great deal of rigidity. The latter measures 19 ft. 9 in. by 4 ft. by 3 ft. 3 in.

The horizontal stabilizer is carried by a box girder which is bolted to the rear bulkhead of the fuselage. The vertical fin is mainly supported by a plywood strut attached to the end ring of the fuselage, as shown in one of the sketches.

The landing gear has N struts which are fixed to the two duralumin box girders of the lower airfoil. The front girder acts as a spacer bar, while the rear girder takes the fittings of the wing bracing struts. The landing gear fairing is covered with sheet duralumin.

The wing is built up of II type duralumin box girders plywood ribs and spruce stringers, and is fabric covered. The drift bracing is by means of duralumin tubes in the supported section of the wing, while steel wires are used in the overhang portion. The ailerons are hinged to false spars of spruce. The cabane consists of duralumin tubes. The wing bracing struts are a composite structure of plywood (for compression) and of tierods (for traction), and are adjustable for length. The tail skid is a leaf spring. The ailerons are controlled by steel tube; the other control surfaces by cables.

The new 12 cyl. V type Hispano-Suiza which forms the power plant of this interesting airplane is rated 450 hp., but it normally develops 480 hp. at 1800 r.p.m. and in the Beaumont Cup racer it was made to turn at 2000 r.p.m., giving approximately 600 hp.

The fuel tanks are mounted in the wing. They can instantly be released in flight by the pilot.

The armament consists of four machine guns, two of these

being mounted on the wing where they fire over the propeller, while the remaining two are synchronized with the engine.

SPECIFICATIONS OF THE NIEUPORT 42 PURSUIT PLANE

450 hp. Hispano-Suiza Engine

Span	39 ft. 6 in.	Weight empty	2700 lb.
Length	24 ft. 9 in.	Weight loaded	3800 lb.
Height	10 ft.	Speed nr. ground	147 mi./hr.
Wing area	270 sq. ft.*	Service ceiling	24,740 ft.

*Including ailerons, but excluding the axle airfoil which has an area of 12 sq. ft. With the two auxiliary wings attached to the landing gear the total supporting surface is 333 sq. ft.

The Bleriot-Spad Pursuit Planes

Blériot-Aéronautique, one of the veteran aircraft firms of France, which for long years was the foremost advocate of the monoplane, produced since 1923 three types of pursuit ships, all of which have the characteristic lines of M. Herbemont's design. That is to say, they are biplanes of almost equal span (the top wing protrudes slightly), with the wings set at a positive stagger and braced by single I interplane struts, and with a well streamlined and rather squat, plywood fuselage of monocoque construction.

The first in date of these ships, the Spad 81, with 300 hp. Hispano-Suiza engine, passed last year the type test of the French aviation service, whereupon the constructor was given a production order. This ship, which is described below in detail, served as the mockup for the two later types—Spad 51 with 380 hp. Gnôme-Rhône Jupiter, and Spad 61 with 450 hp. Lorraine-Dietrich—which were produced to satisfy the requirements of the 1924 program.

The points of difference between these ships are of a minor order, the most outstanding being the different wing arrangement adopted for the Spad 51 as compared to the Spad 61 and 81. While the latter two ships have straight wings of thin section, Spad 51 has a semi-thick profile and only the center section panel of the top wing is straight, while the two outer panels are swept back. Consequently, the top wing of the Spad 51 is composed of three panels. The center section panel is carried by an "open" cabane of four steel tubes which are inclined outward, whereas the other two types have "closed" cabanes of inverted V shape.

Even the dimensions of the three types only vary by a matter of inches, although there is a considerable difference in weight between them, due to the different engines used.

The description which follows equally applies to the three types of new Spad pursuit ships, except where stated to the contrary.

Spad 81 Described

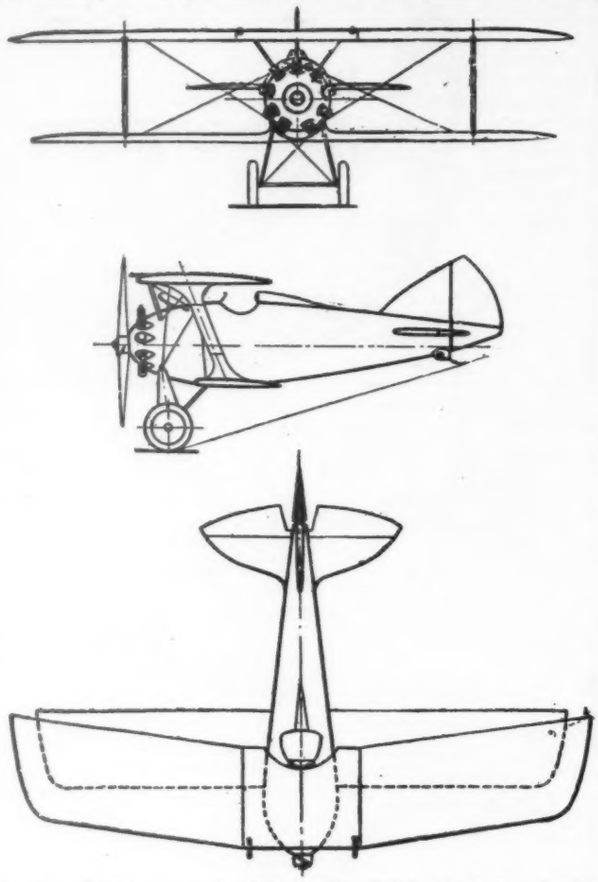
The Spad 81 is an externally braced biplane with slightly unequal wings, which are set at a positive stagger of 14 in. The external wing bracing is reduced to a minimum, consisting of a well streamlined I type interplane strut on either side of the wing, for each half wing, two flying wires, one of which acts at the same time as a drift wire. Both wings consist of two panels. The top wing is mounted on a cabane of steel tubing, which is carried by the top fuselage longerons and is covered by an aluminum fairing. The bottom wing panels are attached to wing roots growing out of the fuselage. The wings are fabric covered.

The framing of the wings consists of two sheet duralumin box girders 3.5 in. high and 1.6 in. wide, the sheets being 3 mm. thick in the top wing and 2.5 mm. thick in the bottom wing. These box spars are cross-braced by duralumin tubes and wires, forming a rigid caisson. The ribs are duralumin stampings. Where the interplane strut fits to the wing, the latter is reinforced by a duralumin box rib 3 mm. thick and measuring 3.5 in. in length and 1.6 in. in width. A false longeron of L section duralumin runs parallel with the rear spar and it is to this longeron that the aileron is hinged. The ailerons are very long and narrow.

The interplane struts are faired duralumin box girders. The fittings for the wing spar attachments are covered by suitable fairings, which give the struts a characteristic sweeping I form.

The fuselage is of the well known Spad monocoque type, which is composed of three layers of tulip plywood, each layer crossing the other at right angles, with external covering of fabric. The fuselage is 14½ ft. long and measures 4 ft. 3 in. at the master diameter. At the forward end an inclined metal bulkhead, which serves as a fire wall, carries at the top the cabane tubes, and at the bottom the lower wing spars.

The engine bearers are box spars, built up of plywood and tulip wood, and are braced to the fire wall by steel tube struts. Two sheet duralumin bulkheads further stiffen the engine bed and act as supports for the cowling. The main fuel tank is of the pressure type and is situated between two



Outline drawings of the Bleriot Spad 51 (380 hp. Jupiter) pursuit plane

metal bulkheads, right aft of the engine. It can be released in flight through an aperture provided in the bottom of the fuselage. The main fuel tank contains about 70 gal. In addition a gravity tank of 5 gal. is mounted in the top wing. The oil tank contains 6 gal. Its lower part, exposed to the airstream, forms an oil radiator. Lamblin radiators of the streamlined type are mounted in a cut-away portion of the fuselage under the motor.

The Spad 61 has Vincent-André eclipse type honeycomb radiators.

The tail surfaces have wooden frames and plywood covering.

The pilot's cockpit is unusually comfortable, the seat being well upholstered and fitted with arm rests. The equipment includes an oxygen inhalator and a self starter. Provision is made for carrying a parachute behind the seat.

The landing gear is extremely interesting. It consists of two streamlined sheet duralumin plates which are joined by a box type duralumin spacer bar, from the center of which the divided steel tube axle is hinged. Two steel tubes further brace the landing gear to the fuselage.

The armament consists of two synchronized machine guns, with 800 rounds of ammunition.

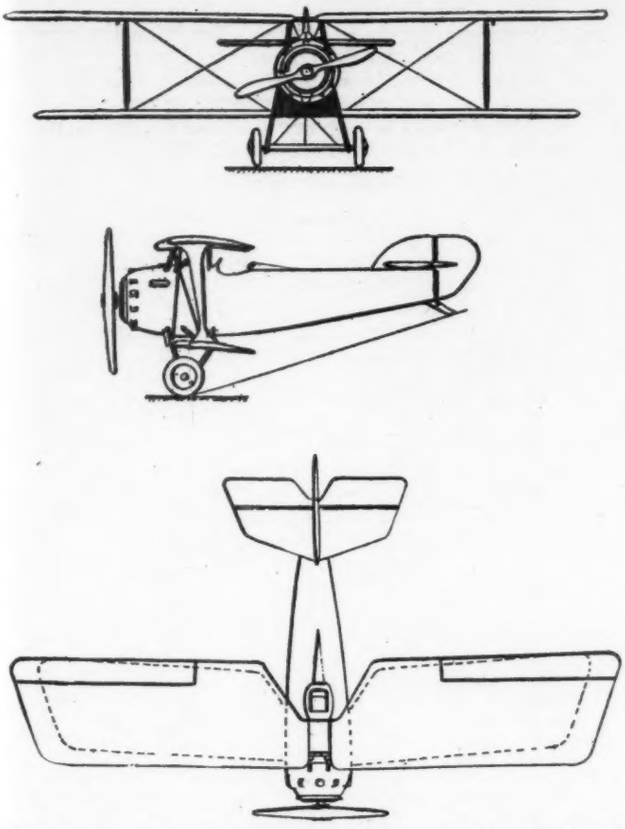
SPECIFICATIONS OF THE SPAD 81 PURSUIT PLANE

300 hp. Hispano-Suiza Engine

Span	31 ft. 9 in.	Weight loaded	2770 lb.
Length	21 ft. 3 in.	Speed nr. ground	149 mi./hr.
Gap	5 ft. 5 in.	Speed at 13,200 ft.	155 mi./hr.
Wing area	324 sq. ft.	Service ceiling	26,400 ft.
Weight empty	1845 lb.	Normal range	465 mi.

The Spad 51 has a wing area of only 280 sq. ft. The weight empty is 1740 lb.—or 100 lb. lighter than that of the Spad 81, despite the more powerful Jupiter engine—and the weight loaded 2807 lb. This ship is said to be a particularly good climber, and to have a ceiling of 33,000 ft.

The Spad 61 has wing area of 345 sq. ft. and it weighs empty 2222 lb. and loaded 3348 lb. Despite the greater weight of this ship it is said to be very fast, not so much on



Outline drawings of the Hanriot H31 (550 hp. Salmson) pursuit plane

account of its extra seventy horsepower as due to the better streamline which it was possible to build around the Lorraine engine.

The Hanriot Pursuit Planes

Two pursuit planes have been produced by the Hanriot company during the past year: the H26, with 260 hp. Salmson engine, and the H31, with 550 hp. Salmson engine. Both engines are of the radial water-cooled type, and both ships are biplanes.

The construction of these two ships differs in several important points, although in both metal has been very largely used. The wings have square section duralumin box spars, hollowed out for lightness, and lattice type plywood ribs reinforced with duralumin flanges. Duralumin box girders are used as compression struts. The wing covering is of fabric. Only the top wing carries ailerons.

The wing arrangement is of the single bay type, with an I type interplane strut. In the H26 this strut slopes outward at a considerabe angle as the bottom wing has a much smaller span than the top wing, and does not therefore require special bracing. The lower ends of the interplane struts "follow through" to a point in the landing gear where they meet two other struts, coming down from the upper fuselage longerons. As both the top and the bottom wings are mounted flush with the fuselage, the resulting structure appears to be extremely strong. The interplane struts are adjustable for length.

In the H31 the bracing system of the wings and of the landing gear is of a more orthodox type, the interplane struts being set vertically while the landing gear is of the conventional Vee type. An unusual feature of this ship is that the fuselage is mounted a certain distance between the top and the bottom wings by means of an upper and lower cabane of duralumin tubes, somewhat in the manner of the wartime Bristol Fighter. The result is not particularly attractive from the viewpoint of streamlining. The reason for this peculiar arrangement may be due to a desire of the constructor to give the pilot maximum vision, a desire which is further emphasized by the fact that there is a free space between the two panels which constitute the top wing.

The fuselage is, in both types of ships, built of duralumin members, but while in the H26 the longerons and cross struts are trellis girders built up of U section members, in the H31 plain duralumin tubing is used instead, with duralumin sleeve fittings and wire cross bracing. In both ships the fuselage has roughly a circular cross section, which is obtained by fixing to the main structure of the fuselage a light structure of wooden stringers and false bulkheads, which is fabric covered from the pilot's seat aft to the sternpost, while the front section is covered with sheet aluminum.

The fuselage of the H26 has a particularly excellent streamline from end to end, an aluminum spinner fairing off the circular cowling of the engine. It seems likely that this streamlining involved some serious difficulties from the standpoint of production facilities, for in the H31 the streamlining is not so elaborate, though still good, and there is no spinner to the propeller.

SPECIFICATIONS OF THE HANRIOT PURSUIT PLANES

Engine	*260 hp. Salmson*	*550 hp. Salmson*
Span	28 ft.	33 ft. 10 in.
Length, overall	25 ft. 5 in.	23 ft. 9 in.
Wing area	205 sq. ft.	356 sq. ft.
Weight empty		2440 lb.
Weight loaded	2530 lb.	3630 lb.

(To be continued)

Book Review

AN INTRODUCTION TO THE ECONOMICS OF AIR TRANSPORTATION. By Thomas Hart Kennedy. (The MacMillan Co., New York, 1924.)

There has long been urgent need for an up-to-date text on the commercial operation of aircraft, a need the filling of which has not even been attempted since the issuance of Holt Thomas' "Aerial Transport." Thomas H. Kennedy, an American who became an enthusiastic student of the subject while engaged in the investigation of transportation problems at Columbia University, has undertaken to step into the breach with this work.

The book is rather a handbook than a text, as it is made up largely of compiled data and of quotations, but as a handbook, with particular reference to the present status of air transport in the eastern hemisphere, it should prove very useful. Nearly thirty pages are given over to a tabulation of the world's air lines, with a discussion of the equipment used by each and the general nature of the service rendered, most of this information having been secured directly from official sources by Mr. Kennedy during an aerial tour of Europe made a little more than a year ago. The log of the tour is given in full, with interesting comments on the several trips taken and on the airplanes used and their piloting, the author's own conclusions being reinforced by quotations from the opinions expressed by Prof. Edward P. Warner and Grover C. Loening as a result of their own experiences with European air transport.

Full credit is given to the operations of the United States Air Mail, the author coming very definitely to the conclusion that this stands first among the commercial flying undertakings of the world, and the operations of the U. S. Army airways are also discussed. They have been too little reported and too little understood by Americans.

The first part of the book is given over to a history of aeronautics and a treatment of the technical features of airplanes and airships, running to a total length of some thirty-five pages, and illustrated with a number of photographs of existing airplanes. This portion of the text is somewhat inferior to the remainder and is unfortunately marred by several errors.

Civil Aviation in the United States

By C. G. GREY

Editor of *The Aeroplane*, London

There is one phase of aviation in which the States can give the World a street's start and a beating. That is in the trans-Continental Air Mail Service. Apparently people in America have been told wonderful stories of the success of Civil Aviation in Europe and have been shown optimistic maps of a net-work of air lines all over our Continent, from London to Moscow and Copenhagen to Rome. And in consequence they think that because we have passenger lines and America has not, Europe is ahead of America in Civil Aviation.

It is true that we have a few short-haul airways which do very well. But most of the much illustrated air-lines on those maps ought to be marked "projected." And a very few deserve to be described even as "under construction."

Air Lines in Europe

The only lines which run regularly with full loads are the London-Paris (250 miles) and the London-Cologne (about 300 miles). Both these are run by Imperial Airways Ltd. with a Government subsidy of £100,000 per annum guaranteed for ten years.

The French lines between London and Paris start fairly regularly but their arrival is intermittent. The London-Rotterdam-Amsterdam service, run by Imperial Airways and the Royal Dutch Airline, is regular but seldom carries full loads. The Königsberg-Moscow line run by the Deruluft Co. is fairly regular but hardly ever carries full load. And the rest start and fly and arrive just when they think they will and whether they happen to be in luck or out of it.*

So, barring Imperial Airways and the Royal Dutch line one may say truthfully that Civil Aviation is a joke and rather a poor one at that. Also Commercial Aviation as such does not exist, except for perhaps half a dozen small firms in England which run joy-rides with standard Avros, and the DeHavilland taxi service, and Major Jack Savage's Sky-writing Corporation.

Against that the U. S. Post Office runs what is far and away the most efficiently organised and efficiently managed Civil Aviation undertaking in the World. That 3,000 mile trip, with its 1,400 miles in the dark, day in day out all the year round is a wonderful affair. No praise can be too high for the men who do the work both in the air and on the ground.

The Secret of Success

And the whole secret of its success is that the real work is done on the ground. The effort and the man-hours put into marking and lighting the route and keeping the engines in perfect running and operating the signal system far exceeds those expended in the air.

The pilots are splendid. One has met some of them and they are of the very finest type of aviator. Their pluck in ploughing through fog and darkness is immense and their resourcefulness and intelligence in dodging bad weather and getting into bad fields and out again is wonderful. But they themselves are the first to admit that the real hard work is done on the ground. As Mr. Paul Henderson said, "An air-way exists on the ground, not in the air."

That is a basic fact which our air-line organisers in Europe still have to understand. Our idea is to build and organise elaborate terminal aerodromes, equip them with radio gear and all the comforts of a home and then push the aircraft into the air relying on what we hope to be infallible engines. Barring radio talks there is no intermediate connection between the machines and the ground and any intermediate landing fields are only what the pilots themselves have discovered for themselves.

The U. S. Post Office idea is to have a landing ground of a sort every few miles and a real field every 25 miles, with proper lights and signals to tell the pilots what the weather is like not more than 25 miles ahead.

The result is that European machines crash every now and then through landing in fog whereas with proper signalling they would know that if they flew over the fog or through it they would find clear air a little further along the route.

U. S. Air Mail a Model for World

The whole system on which the U. S. Air Mail is run is a model for the World, for it is the triumph of efficiency over finance. In spite of funny old-fashioned wooden hangars and dirt floors the mechanics maintain their old war-time ships in beautiful order. And in spite of high landing speeds the pilots do not crash them. The mails are run astonishingly close to schedule time. The casualties are amazingly few. In fact the complete outfit is a wholly admirable institution which reflects the greatest credit on everybody concerned.

On the purely commercial side also the States can give us points. We have, as already stated, some few "gypsy flyers" with Avro biplanes and the D.H. Taxi Service. But in America, besides the gypsy flyers there are quantities of private owners who use their ships simply as a means of conveyance, whereas we have in England one doctor who flies for sport and two officers of the R.A.F. who keep their own machines, and that is all.

The opportunities for civil flying, and for real commercial flying, in the States are immense. With such huge distances and so much flat country and such slow trains it ought to be possible to establish paying air-lines in considerable numbers.

One had several opportunities of talking to men who handle big business which has nothing to do with Aviation and one was impressed by the favorable way in which they regarded flying. They see that air transport has got to come and they are only waiting till they are convinced that it is reasonably safe before they come in on it themselves with the big money.

There is no reason why flying should not be made safe. Admittedly pursuit ships and fast sporting planes must be quick on their controls and easily maneuverable, but for passenger transport the slogan must be "Safety First" and to that end the ships used must be fool-proof and yet reasonably fast.

The Air Express Desired

Both at home and in America one has been constantly chaffed for refusing to fly. One's personal view is that having assisted in a quite satisfactory crash in 1910 and having flown at infrequent intervals since, up to the point of crossing the English Channel at 500 feet in a single-engined machine which lands at 70 miles an hour and when stalled at 65 miles an hour does an uncontrollable nose-dive for 300 or 400 feet, one is now exempt from flying till a reasonable passenger machine is produced. And here is the specification for such a machine:—

(A) Top speed not less than 120 miles an hour.
(B) Cruising speed not less than 100 miles an hour.
(C) Low flying speed under full control without losing height 45 miles an hour.
(D) Stalling speed, at which it must sink without diving and must remain under full control, 35 to 40 miles an hour.
(E) Landing speed, at which it can be dropped onto the ground from a height of 20 or 30 feet, not more than 25 miles an hour.

Such machines already exist (in the Fairey "Flycatcher") but only as deck-flying single-seat fighters. There is no reason whatever why passenger-carriers should not be built with exactly the same characteristics.

For cross-country flying over reasonably good country they may be single engined. But for flying over sea or over long stretches of lakes, or over broken country such as that to the

*Mr. Grey appears to overlook the daily mail and passenger services operated by the Latecoere Air Lines between France and North Africa, and the Paris-Warsaw and Paris-Constantinople-Angora services run by the Franco-Roumanian Air Navigation Co., which are by far the longest regularly operated airways in Europe. The Latecoere service, in particular, has achieved a splendid reputation for dependability and efficiency.—EDITOR.

West of New York they should have three engines, so that if one stops there is enough power in the other two to keep the machine flying till it reaches a proper landing ground.

Such aeroplanes can be built today. And the firm that has the foresight and the enterprise to build and operate them is going to make money. But it has got to operate these ships over a definite route for twelve months before the General Public will use them regularly. And then it has got to run them for another twelve months or so before the Big Money will come in and start an air line boom.

A Few Anticipations

History is the greatest plagiarist in all literature. It always steals its own ideas of a generation or two earlier—with variations. At present Commercial Aviation is in the state of the early days of railways when odd little bits of railways ran from somewhere to nowhere in particular and lost money for their owners. As for example the old Chicago, Burlington & Quincey road, of which it is alleged that on one occasion the engineer entered in his way-bill:—"Three minutes in front of time through chasing Bill McGuinness's pig."

Our air lines today are just as funny. Even that wonderful New York-San Francisco Air Mail line is funny if one puts oneself some ten years ahead, when the New York terminal is on the roof of the Pennsylvania Station, instead of in a little wooden hut in the middle of Long Island, and when special mail-ships do 200 miles an hour guided and warned of fog by directional radio instead of old war-junk doing a paltry 100 miles an hour guided by acetylene flicker-lights and mere common electric search-lights.

Then the New York-Frisco journey wll take only 15 hours. And anywhere in the States will be within that time of anywhere else.

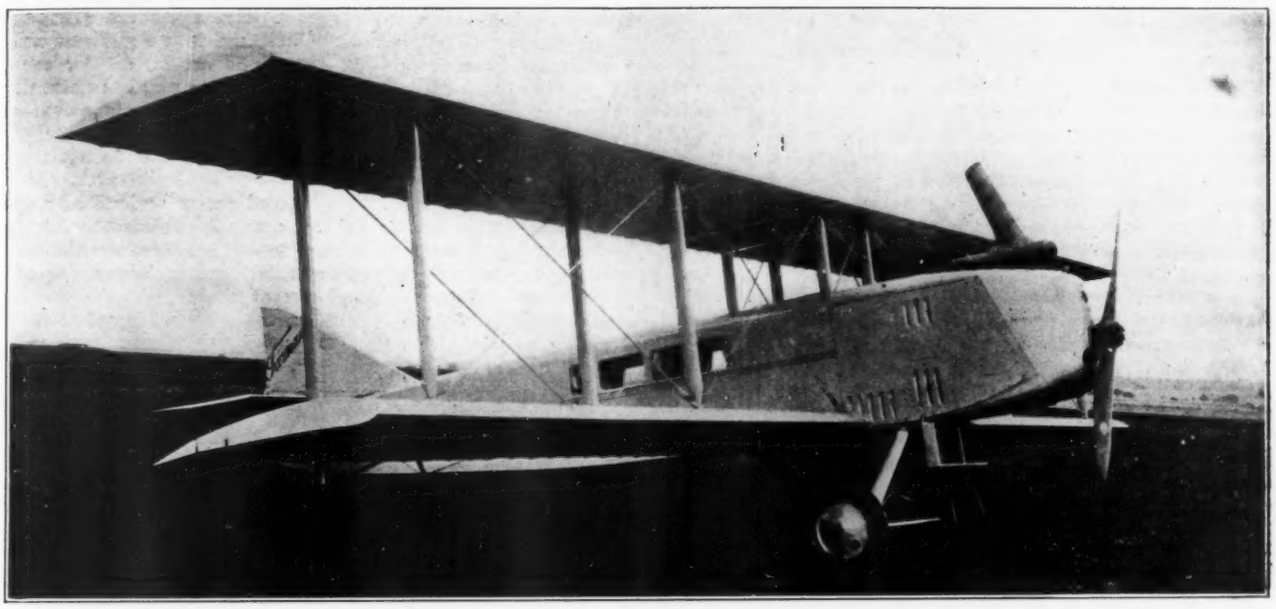
Also, as the Z.R.3 showed, there will be a regular passenger airship service running from London to New York in 2½ days, or possibly less, as airships grow bigger and speeds are pushed up. It is only a matter of faith and enterprise and money. And America has all three, with a goodly share of each to spare.

However, to come back to modern times—as a certain English pilot remarked to a too-enthusiastic prophet in New York the other day—The present state of Aviation in America impresses one as being quite satisfactory considering all things.

Progress has been set back, it is true, by various obstacles. But obstacles are only sent to try our faith and endurance. They are like those exercising machines which are designed to develop muscle. We are all the stronger and better for having overcome the obstacles which we meet.

The general atmosphere of Aviation in America impressed one as being in that state when something is just going to happen. Not so much the calm before the storm but rather the slump before the boom.

We had much the same feeling in England a couple of years ago, and though we have not exactly a boom today, we have a state of very fair trade in the Aircraft Industry thanks to big orders from the Royal Air Force. And our subsidised air line (Imperial Airways Ltd.) will certainly make good in spite of the enervating effects of subsidies, which are all wrong in theory and in fact.



Farman F70 (300 hp. Renault) commercial plane, a number of which have just been placed in commission on the Paris-London service. This ship carries four passengers and a pilot, or 1500 lb. of freight, and has a high speed of about 120 mi./hr.

In England the possibilities for Civil Aviation are much less than they are in America, but we shall muddle through somehow, as we always do. And while we are doing so, no doubt America will go ahead and get the big business as America has done with bicycles and automobiles and telephones and radio and most other things that makes life more terrible.

Hopes for Closer Cooperation

But, one hopes that in the development of Aviation, England and America may work more closely together than in any other field, for we need one another to meet the Yellow Peril. All the people in American Aviation, with very few exceptions, recognise that fact and most people in British Aviation are equally wide awake to the need for a good working alliance.

Personally one can never hope to return even a fraction of the kindness which one has received from so many people during one's brief and very happy visit to the States. If one has done any injustice to American Aviation or to any individual American one regrets it deeply. One has merely written of what one has seen, or has thought one has seen. First appearances are often deceptive, and anyhow, as monocles are not fashionable in the United States, one admits having had a one-eyed view of a great many things in the course of one's journeyings.

But whether one has made mistakes or not, all one can do is to devote oneself in future to helping towards a better understanding between the two sections of the English-speaking people who happen to be separated by the Atlantic.

Displacement Limits for Light Plane Engines

By GLENN D. ANGLE

Consulting Engineer

It is very gratifying to note that steps are being taken to establish limits on the piston displacement of engines to be entered in the light plane events of 1925, and it is believed that once these limits are logically determined, real progress in this class of engine development will shortly follow. The writer has given the matter a great deal of thought and is submitting suggestions, together with the reasons therefore, upon which it is hoped to obtain either constructive criticisms or the approval of others who are also interested in the subject.

Four Categories Suggested

In the following table will be found the piston displacement limits proposed, accompanied by the possible power outputs and the number of cylinders that may be used in practice with each one. The latter two items are included mainly for convenience during an examination of the suggested displacements. The power outputs in each case cover a rather wide range, but not necessarily the maximum or minimum with the various speeds and mean pressures that it is possible to employ. The number of cylinders as well as their arrangement is a matter to be decided by the engine designer to suit his particular purposes: the number given here merely represents the most practical individual cylinder displacements.

Displacement cubic inches	*Horsepower Range*	*Number of Cylinders*
40	1 to 12	2, 3
80	12 to 20	2, 3, 4,
120	20 to 35	3, 4, 5,
240	35 to 65	3, 4, 5, 6

It will be noted that the four sizes suggested bear a certain relationship, and furthermore, that these displacement limits very conveniently include most of the foreign and domestic engines of this class that have been built to date. The principal feature in adopting all of the sizes proposed is that there are no gaps in the possible outputs from 1 to 65 hp.

The 40-cu. in. engine should satisfy the power requirements of practically all of the tiny ships that are so often referred to as motor-gliders. This obviously is as large as an engine needs to be for ships of this class; moreover the requirements are not so inflexible as to warrant the adoption of more than one size. Existing two-cylinder opposed types falling well within these limits are the A.B.C. (British) light-plane engine, and the Harley Sport (American) motorcycle engine. By reducing the cylinder bore about 1/16 in., the Morehouse (American) and Blackburn (British) light-plane engines could be made to conform to these requirements. This would eliminate, of course, the Douglas (British), Anzani (French), and Siemens (German) engines of 45 cu. in. displacement unless perchance their manufacturers would consent to a small reduction of either bore or stroke.

What the 40 cu. in. Engine Will Do

A well designed 40-cu. in. engine using propeller reduction gears with a ratio of 0.5 should transmit from 15 to 18 hp. at 2500 to 3000 r.p.m. very effectively. It is not felt that there should be any special rules to handicap a design of this sort. Certainly the advantages are earned when one produces a reliable high-speed engine that drives a more efficient propeller, especially when the gain offsets the added weight of reduction gear and the latter proves as efficient and reliable as the balance of the engine.

It is hardly necessary to boost the 80-cu. in. size as this has practically become a standard among many of the light plane people. Engines of this displacement should have an output sufficient to attain excellent performance in single seaters, and also enough to satisfactorily fly a two seater, since an output of 35 hp. or more is not at all impossible. In competitions it would seem best to have separate events for single and two-seater planes if there is the least doubt as to the fairness to all entries of the handicapping system. At any rate there is no reason to discourage two-seater designs around 80-cu. in. engines if the airplane constructors see fit to develop them.

There are several existing engines within the 80-cu. in displacement limit. The Indian and Harley two-cylinder Vee type motor cycle engines have displacements of 61 and 64 cu. in., respectively. Two British built two-cylinder opposed types, the Bristol and A.B.C., have a displacement of 67 cu. in., as do also the Anzani (French) and Blackburn (British) three-cylinder radial engines. There are four American built motorcycle engines between 70 and 80 cu. in. displacement, if we care to consider them for light plane use, but naturally our main interest lies in the new 80-cu. in. light-plane engines that are now being developed in this country. The writer has no record of engines of over 80 cu. in. that do not more nearly satisfy another class.

The third member of the proposed group undoubtedly has the fewest arguments in its favor, but is included to fill the power gap as a matter of completeness, and also for the benefit of a small group who are advocating larger engines. Engines of 120-cu. in. displacement should be no more reliable than the smaller ones of an equal degree of refinement; yet, on account of a greater output, they may eventually prove quite popular in case the 80-cu. in. engines actually prove to be too small. The 120-cu. in engines should be regarded for single-seaters and two-seaters of a different or larger class, and with no idea of competing with the 80-cu. in. engines or even replacing the latter for a period of time at least. It is only through rigid rulings of some sort to avoid unfair competition or comparison that the greatest developments will be forthcoming. As far as is known no engines of around 120-cu. in. are being developed for light plane use outside of France.

The Upper Limit

On the assumption that an airplane weighing 500 lb. empty is the largest in the light-plane category, an engine of 240 cu. in. piston displacement should be sufficient. In fact, an engine of 200 cu. in. displacement might answer the purpose very well, but there is really no reason for establishing more than one displacement limit among the larger sizes. Sport planes carrying pilot and one or two passengers can be made to perform very satisfactorily with a 240 cu. in. engine, therefore airplanes of this type may also have some commercial uses. At present there are available two three-cylinder radial engines of less than 240 cu. in. displacement, the Anzani and the Wright "Gale", which was formerly known as the Lawrance LA.

Since these proposals leave no gap in the horsepower range and only cover four engine sizes, it is believed that they cannot be very far off from the acceptable limits. At any rate, here are some figures which everyone interested in light plane and engine development should give immediate consideration so that the limit on piston displacement can be established as early as possible..

Government Bids and Awards

Air Service Awards

Aircraft Switches—Eclipse Machine Co., Hoboken, N. J., 200 starting switches, magnetically operated, $7; 100 safety push buttons for starting switch, $3.50.

National Electrical Supply Co., Washington, 200 navigation light signal switches, 76c.

National Steel Products Co., Dayton, Ohio, 300 landing light switch assemblies, $3.90. (Nov. 24, 1924).

Landing Wheel Assemblies—Dayton Wire Wheel Co., Dayton, Ohio, 100 airplane landing wheel assemblies, $16.50. (Nov. 24, 1924).

Hangar Doors—Belmont Iron Works, Philadelphia, item 1, 18 sets six to set of steel doors, $550; 2, 2 sets ten to set do, $1,400; 3, 4 sets of four to set do, $1,510. (Nov. 17, 1924).

Aircraft Defense More Expensive than Battleships?

Secretary of the Navy Wilbur Makes Pessimistic References to Naval Aircraft

Secretary of the Navy Wilbur in a letter to Representative Burton L. French, Chairman of the Subcommittee on Naval Appropriations of the House Appropriations Committee makes the position of the Navy toward aviation very plain.

He begins by "assuming that these aircraft have any value whatever in naval warfare." Compare Admiral Moffett's statement made a year ago, which said: "Out of three hundred and forty million dollars allowed for the maintenance of the Navy, Naval Aviation is allowed less than fifteen millions. On this meagre appropriation we have managed to struggle along and barely keep aviation afloat," with Secretary Wilbur's statement that "It is true we have not acquired the airplanes we deem necessary as adjuncts to the fleet, but Congress has made ample appropriations in the past."

But more significant of the Secretary's attitude toward aviation is his statement: "The air service is a very expensive method of offense and defense because of the short life and great expense of the airplane. The life of an aircraft is estimated at two years as against twenty years for a battleship. The development of new types of planes is exceedingly expensive."

By inference it can be assumed that the Secretary feels that the development of $45,000,000 battleships is inexpensive and the upkeep of a battleship and all the ships upon and beneath the surface that have to give it protection is low when compared to aircraft. If a battleship lasts twenty years as first line defense, which we gravely doubt, it means that aside from upkeep its cost is over $2,000,000 a year. This alone would build 100 bombing type airplanes each year. A comparison of the cost of upkeep of these hundred planes and a battleship would be illuminating. Secretary Wilbur's statement regarding aviation follows.

"The latest development in modern warfare grows out of the invention of the airplane. Assuming that these aircraft have any value whatever in naval warfare, and it is clear that they have great value for many purposes, it is evident that a fleet must have aircraft auxiliaries. As each power will be supplied with this new arm, it follows that combats will also occur in the air to secure supremacy there and to interfere with the work of the airplanes of the enemy in observation, scouting, spotting for the ship, gun, etc. Assuming that aircraft are essential in long distance firing for a fleet, in order to maintain the force necessary for such observation and for scouting observations, it is necessary to defend these planes from an attack which would prevent their necessary service.

"When aircraft are for bombing surface ships and submarines, it is evident that the air fleet, as well as the surface fleet, must be balanced with reference to an opposing fleet, and organized and maintained with regard to its offensive power against surface ships. The various problems involved in the creation and maintenance of an air force for these different roles have received careful and constant consideration of the department. The problem of the development of this arm of the service had been placed in a bureau organized for this purpose, coordinating with other bureaus and with the Army, and referring its problems of strategy and logistics to the General Board of the Navy and some of its problems to the joint board of the Army and Navy. Great progress has been made along these lines.

"You suggest in your communication that we recognize that we are not upon the treaty ratio with reference to aircraft. This is because our aircraft carriers are not completed.

"It is true we have not yet acquired the airplanes we deem necessary as adjuncts to the fleet, but Congress has made ample appropriations in the past and we believe will make increasing appropriations in the future fully to develop this branch of the service as rapidly as is consistent with the orderly development of the new types of craft needed. The Air Service is a very expensive method of offense and defense, because of the short life and great expense of the airplane.

"The life of an aircraft is estimated at two years as against twenty years for a battleship. The development of new types of planes is exceedingly expensive. The maintenance of national defense by aircraft alone would be an economic impossibility. As evidence that the subject has not been neglected by the Navy, it may be stated that the engines on hand, built and building for naval aircraft are almost twice as great in horsepower as of all the engines of all the ships of the entire American Navy at the time of the Spanish-American war.

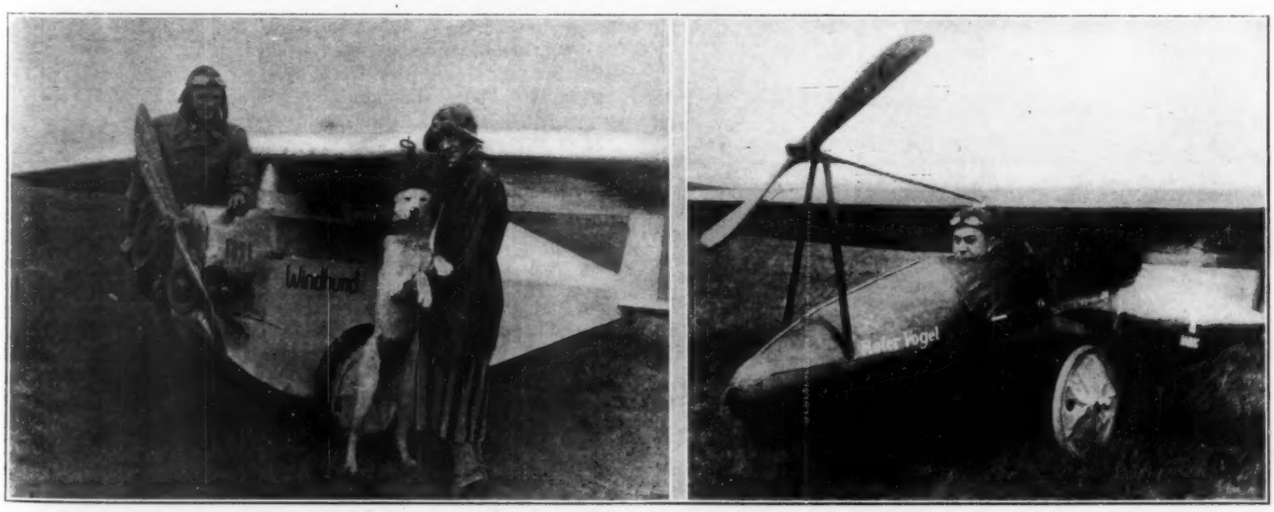
"A full discussion of the subject of aircraft in war is not necessary or desirable at this time particularly in view of the fact that a special board acting under my instructions and at the suggestion of the President, is now engaged in an intensive study of this problem. It is sufficient at this time to say that aircraft have a definite limitation of capacity under the laws of nature and that the problem of naval equipment and strategy must be worked out in view of these known limitations.

"Inasmuch as the availability of aircraft is peculiarly dependent upon their range of action from their base, there is no method of establishing a just ratio between the aircraft of the different powers. The effective power of aircraft across the Atlantic or Pacific today is practically zero. The value of aircraft operating from the coast would depend upon the position of the enemy ships. At present, by withdrawing a given or known distance from the coast the offensive value of aircraft against such ships can be reduced to zero.

"We are not behind in aircraft development or production. We do not yet have the aircraft needed to carry out our aircraft program for planes aboard ship and for planes for the aircraft carriers. Further information will be accessible to Congress upon receipt of the report of the General Board."

Czechoslovakia Wants Air Ministry

A bill has been introduced in the Parliament of Czechoslovakia providing for the creation of an Air Ministry which would be charged with the control of both military and civil aviation. The new ministry would combine the services now distributed between the departments of national defense and of labor, and also include the meteorological service.



Photos Kadel & Herbert

Two German motorgliders, that is, gliders with an auxiliary engine—Left, the Fulda "Windhund," with 4½ hp. Ilo engine and 86 sq. ft. of wing area; right, the Baumer "Roter Vogel," with 3 hp. (350 c.c.) Douglas engine and 108 sq. ft. of wing area

National Air Policy Suggestions

Editor, AVIATION:—

Your kind invitation to your readers to criticize or discuss your National Air Policy tempts me to accept although I do so with some reluctance, for I feel that so many able aeronautical minds can hardly have overlooked what seems to be an important matter. It relates to both the Governmental and Commercial operation of aircraft.

If it be the real intention of the Government to encourage the commercial operation of aircraft, why advocate "a country wide Air Mail system—connecting the principal cities of the country" as a governmental operation? Why not urge Congress to pass the necessary legislation which will authorize the Postmaster General to contract for this service? Pass either the Steenerson, Kelly, LaGuardia or some other enabling bill.

The present Air Mail service is the only system of mail transportation operated by the Government; all other forms are contracted for. The Post Office Department has always contended (before the House Appropriations Committee, especially) that the Air Mail Service was a demonstration of the feasibility of airplane transportation. This demonstration has been successful and even night flying has apparently proven so successful that a further extension will be inaugurated in the spring by starting the supplementary Chicago-New York over night service.

The declared policy of the P. O. Dept. has always been to turn over the carrying of mail by air to private carriers when the law permitted and contractors were able to fulfil such contracts. I think it will be conceded that a contract to carry the mail would in many cases prove to be an important if not the controlling source of revenue which would induce private capital to back a favorably located airplane transportation company.

If then we are ever to have other than Governmental aerial activity, why is it not most important to make it possible for the P. O. Dept. to give some or all of this *transportation* business to private aircraft carriers? I can think of nothing which would so encourage capital to embark on this new mode of transportation.

Are we going into an extensive system of transportation operated by the Government or are we to continue our present century-old policy?

If our reserve air force is ever to be an important factor in our national defence, why not do at least one sensible and obvious thing to assist in bringing it into existence?

L. B. LENT
Cleveland, Ohio.

Ed. Note.—The reference "a country-wide Air Mail system . . . connecting the principal cities of the country" was not meant to imply that all of the system should necessarily be Government operated.

Editor, AVIATION:—

Regarding "A Suggestion for the Winslow Bill" I wish to say what follows:

1. The job of the Post Office Department of our Federal Government is to forward the mails. That it uses aircraft in doing so and has developed a particular technique, skill and experience in doing so is no more reason for assigning to the Post Office Department the job of regulation of civilian use of aircraft than is the experience of the department in handling Parcels Post a reason for turning over to the Postal Authorities the regulation of the Express Business or of the Transportation of Baggage.

2. To my mind it was because it was not the job of the Army or of the Navy to promote measures for civilian use of aircraft that the job of administering the general provisions of the Winslow Bill was not assigned to one or the other of these departments of the Federal Government.

3. How much longer is the aircraft industry likely to persist in looking to Federal aid for its commercial development?

4. Practically speaking, the commercial and private use of aircraft does not exist. The one or two brilliant exceptions to this general statement merely emphasize its practical truth.

5. The Government should lend its police power to the regulation of the private and commercial use of aircraft covering such phases as skill and registration of pilots, suitability of landing fields and administration thereof, airworthiness and identification of aircraft and traffic rules. When the commercial and private use of aircraft becomes a real factor in the business of transportation, insurance in its various forms will be required by investors and will be generally utilized. The police power of Government can be readily associated with the needs for information for underwriting organizations. If the proponents of the Winslow Bill were prepared to advocate in lieu of direct Government administration the creation of an organization corresponding to the American Bureau of Shipping in which Government and Underwriting and Industry are each represented, and which functions for bottoms of American registry pretty much as does Lloyd's marine register, such an organization would be given a title perhaps of American Bureau of Aircraft Navigation and Rules and Regulations covering various phases for control of other than State use of aircraft could be adopted and promulgated with all interests concerned properly represented in their preparation. Their application and enforcement could keep pace with the development of the industry on either a local or a national scale.

A. R. SMALL
Vice President, Underwriters Laboratories

New Automatic Stabilizer

The problem of automatic stability in airplanes is one which has long been of interest to inventors. By automatic stability is meant a device which will keep an airplane on a straight course without the intervention of a pilot. In this country Lawrence Sperry went a long ways toward producing an "automatic pilot" through the use of a gyroscopic apparatus which actuated the controls through an air pressure system. This was in 1914, when he fitted the apparatus to a Curtiss flying boat and flew it with considerable success. As he received no encouragement from the United States Government, he took the plane to France where the apparatus was thoroughly investigated and its value recognized.

There have been several other attempts to produce an automatic pilot, perhaps the most successful of these being the apparatus produced by George Aveline in England in 1918. This apparatus was described in detail in the March 21, 1921, issue of AVIATION. The basic principle was a mercury container, in which, when the machine was out of balance, the mercury would rise on one side, which closed a series of electric contacts and these opened the valves of a compressed air piston actuating the controls.

The container was tilted as the controls moved and venturi tubes affected the level of the mercury, thus taking into account variations in the speed. In this original apparatus the fore-and-aft control and the aileron control were automatic, but the rudder was controlled by the pilot. The device was fitted to several Handley Page bombers and was tried out on the London-Paris commercial air service with considerable success.

It is now announced that the Aveline stabilizer has further been perfected by a Frenchman, Mr. Mazade, a few years ago. Only few details have become available on the new stabilizer, but it is known that the rudder as well as the aileron and elevator are now controlled automatically. The pilot takes off and lands the machine, but once in the air he throws on the automatic control and the machine flies itself. When he wishes to rise he presses a button and holds it down until he has gained sufficient altitude. If he wants to turn to the left he presses another button, and the machine takes the correct bank and turns, straightening out as soon as he releases the button. Pilots and passengers say that the machine flies a straighter course and adjusts itself more smoothly and quickly to bumps than the same machine piloted by hand. At present the apparatus is only fitted in two Breguet 14Tbis cabin planes of the French air service, but it is to be installed shortly on several military bombers. This equipment has also been ordered for three Farmans on the London-Paris line and for three of the three-motored Caudrons which are being used on the night service of the Franco Roumanian line.

It is thought that the apparatus will be of particular value for long night flights and cloud flying.

Volcano Destroys Landing Field

Editor, AVIATION:—

Last year when the air forces of the United States Army at Honolulu desired to establish a landing field on this island, they sent a committee headed by Captain Kirkpatrick to make the investigation, and curiously the most suitable place was found to be on a bar of volcanic ashes within the crater of Kilauea Volcano, but a short distance from the 50 acre lake of molten lava. The Captain felt that it would be quite fitting that the wandering aviators should be guided by a pillar of smoke by day, and by a pillar of fire by night.

During November, 1923, the excellent airplane views of the Hawaii National Park, as published in the February *National Geographic Magazine*, were obtained by Lieut. R. C. Wriston of the Air Service, assisted by Sgt. Richard Agnew. At times during their flights they were within 500 ft. of the lake of fire with its temperature of 2000 deg. F.

A Hawaiian landing field that was—before Kilauea volcano erupted and covered the site with boulders and lava

In May 1924, after being on good behavior for 134 years, Kilauea Volcano blew up, and bombarded the immediate vicinity with thousands of bombs of red hot lava; and destroyed the automobile road over which thousands of tourists had visited the volcano during the previous few months. During this eruption the airplane field was thoroughly pelted with boulders, some weighing as much as eight tons, going almost one mile high in their flight, and smashing out huge shell craters where they struck on the landing field. The inclosed print gives an idea of how thoroughly this work was done, so that one could hardly land a wheelbarrow, much less an airplane.

THOMAS BOLES
Superintendent, Hawaii National Park
Volcano House, Hawaii

Strong Views on Air Power

Editor, AVIATION:—

I wish to avail myself of the invitation of the publisher of AVIATION to comment briefly on an Independent Air Force.

First, the greatest champion of the scheme is a Britisher, Mr. Grey of the London *Aeroplane*, and he is the most astounding Britisher "one" has ever read. His article in your issue of Nov. 10 bespeaks crass ignorance of the influence which the British Navy has had upon the building of the British Empire and upon World History in general. The manner in which he discredits his Navy smacks of a personal grudge.

Second, his conclusion that the Royal Air Force is now Britain's first line of defense vice the Royal Navy (Retired) is grossly stupid. Granted that the Royal Air Force can prevent armed *invasion* of the British Isles, can it alone prevent England's Colonial possessions, Dominions and World Markets from being gobbled up by a naval power? Can it guarantee the integrity of the Empire as the Royal Navy has done for the past century? Can it prevent a starvation blockade of the British Isles? Mr. Grey erroneously states that the Royal Air Force *did* raise the German blockade, but well informed people know that the North Sea mine barrage, the ceaseless patrol of surface craft and the organization of the convoy system were more important factors in raising the submarine siege than was the Air Force.

It is easy for Mr. Grey to come over and tell us what to do—and for General Mitchell to advocate Air Power to the exclusion of Sea Power—easy because they apparently have no understanding of Sea Power and the influence which it has had, and must necessarily always have, upon the destiny of nations. In the present state of Aviation, how under the sun if we rely upon it alone, can we expect to maintain anything but our *continental* shores from *invasion*? How can we maintain the Monroe Doctrine, the Open Door in China, the Most Favored Nation Treatment, the Immigration Policy, our outlying possessions and World Markets? When the limit of aviation development is limited by the development of the internal combustion engine, and this engine has already very nearly reached the limit of development, how can we so surely and arrogantly say that Air Power will "dominate the Sea Lanes of communication" in the future? When this becomes a fact—when an overseas flight can be made any time regardless of wind and weather, making it's own bases as it goes, without surface assistance from land or sea, and in such strength that it can *hold* what it *takes*, then and then only will Sea Power retire in favor of Air Power and the Navies and the Armies of the world be scrapped.

This sounds like a comment on Air Power, versus Sea Power and Land Power, rather than upon an independent Air Force, but the greatest danger of an *Independent* Air Force *is* it's *independence*—its assumption to itself of the proper functions of the Army and Navy, its claim to supplant them rather than to be an integral part and arm of them. Once committed to an Independent Air Force, the enthusiasts will not stop until our Sea Power and the vestige left of Land Power is bartered for a chimerical dream. Having exchanged realities and facts for possibilities and fancies, then we will be perfectly competent to sit at *home* and sticking our fingers to our noses, say, "Come on, I dare you."

The writer is a naval pilot, so serving, and is an aviation fan. But the danger of an independent Air Force, and of the propaganda now appearing—and it is assumed that it will continue to appear in the Hearst papers from ill informed, fanatic, Mr. Grey, is a distinct menace to the country, whatever else it may be.

GEORGE R. FAIRLAMB, JR.
Lieutenant, U. S. Navy
U. S. Naval Air Station, Coco Solo, C. Z.

Curtiss Congratulates Ferbois

C. M. Keys, president of the Curtiss Aeroplane & Motor Co., Inc., of Garden City, L. I., sent on Dec. 12 the following telegram to the F.A.I. headquarters in Paris:

"Permit me to extend through you to Mr. Bonnet and also to the manufacturers of both the motor and plane with which the world's record was recently brought back to France, the sincere and heartfelt congratulations of the Curtiss Aeroplane & Motor Company, Inc.

"If we had to lose this world's record, we are glad to have lost it to so gallant a pilot and to the manufacturers of such sterling quality.

"I trust that this rivalry for speed will continue, especially if it results, as it has in this country, in a steady betterment of the quality and safety of the vast types of airplanes used by the military services.

"We are glad again to be friendly competitors and allies of the gallant air service of France in the further quest of the air."

M. Bonnet, the world's new holder of the straight away speed record (278.38 mi./hr.), piloted a Ferbois monoplane equipped with 450 hp. Hispano-Suiza engine, Levasseur-Reed metal propeller and Lamblin radiator.

The previous world straightaway speed record—266.6 mi./hr—was made Nov. 4, 1923, at Mineola, N. Y., by Lieut. A. J. Williams, U.S.N., on a Curtiss-Navy racer with 500 hp. Curtiss D12a engine.

AIRPORTS AND AIRWAYS

Air Mail Pilot Gilbert Killed

While flying the night mail through a heavy snowstorm, Air Mail Pilot Clarence O. Gilbert was killed on the night of Dec. 21-22, last, near Kaneville, Ill.

Gilbert was a reserve flier, stationed since he entered the service on Aug. 15, at Iowa City. He had been an Army man fourteen years, and until August was a flying sergeant at Fort Cook, Omaha. He was called to Maywood for the Christmas mail rush. His last trip was the third he had taken over the route west from Maywood.

Gilbert took off at 7:10 o'clock Sunday evening. Five minutes later Pilot R. L. Wagner followed him. Near Kaneville Wagner flew above Gilbert in a blinding snow storm. He saw something was wrong with Gilbert's motor.

Gilbert did not know the route well, and the snow masked the guiding blinker lights below him. When his motor failed he could not tell where he was or at what altitude. So he decided to trust to his parachute. He jumped, but the stabilizer, or elevator of his plane, cut the parachute's shroud lines, and the aviator fell approximately 1,500 ft.

The airplane traveled half a mile further and fell, 150 ft. from a farm house. The machine was wrecked, but the mail was undamaged and was continued on to Omaha shortly after dawn in a plane piloted by the veteran R. G. Page.

Wagner's report at Iowa City caused an alarm to be sent out for the missing aviator.

Pilot Gilbert was 32 years old. His home was in Junction City, Kan., although he and his wife had been living in Iowa City.

His death was the first since the Western air mail service was started on July 1 and in 1,200,000 miles of mail flying.

Canadian Air Activities

The Fairchild Co. of Canada has now put its Huff Daland seaplane on skis for the winter months, and is filling a contract for 500 sq. mi. of forest mapping. This will be a pulp wood survey and for the Wyagamack Pulp and Paper Co. of Three Rivers, P. Q. Pulp wood shows up exceedingly well under snow conditions, as the hardwood trees are bare of leaves, leaving the green pulp wood standing out clearly in the photographs.

The Laurentide Air Service of Three Rivers, P. Q., will also put its recently acquired Westland limousine on skis, and use it for passenger work in the Rouyn gold fields, northern Quebec. The one machine will be sufficient to handle the winter traffic up there where it is warm at forty below.

The Ontario Forest Fire Patrol, having finished the summer's operations, has flown its thirteen HS2L's in to the winter base at Sault St. Marie, for the winter overhaul. They have recently purchased from the States one Loening Air Yacht for use next year. This machine was flown up recently for delivery by Harry Rogers, who made the trip from New York to Montreal in three hours flat.

The newly designed Vickers forest patrol boat, with 275 hp. Rolls Royce motor, has just completed her initial test at Montreal, and has been shipped to the R.C.A.F. station at Jericho Beach, B. C., for further test throughout the winter, as there they have open water the year around.

News from Illinois

The Decatur Aircraft Co. of Decatur, Ill., has been formed between W. S. Thompson, an instructor at Park Field, Memphis, Tenn., during the war, and previously test pilot for the Curtiss Company, and Robt. L. Ward, of the Air Service Reserve Corps. The new company owns five land planes and an Aeromarine flying boat, and will engage in general commercial field business, as well as in building up one-place Thomas Morse Scouts into two place Sport planes. The firm will handle a full line of Curtiss, Hisso and Rotary parts as well as general supplies.

H. E. Nemyer, who was pilot with the late Clyde Horchem, is to return to Decatur very soon for the winter.

On Lieut. H. G. Peterson's DH4B an unusual happening took place recently. The spare tire carried under the front cockpit, (regular DH hookup) exploded, loosening the front controls badly, and tearing out the bottom of the cockpit. In addition, the "bump" killed the motor. This is something that has never occurred at Chanute Field before, according to all that knew of the happening.

Night Service for London-Paris Air Mail

The success of the American air mail service in night flying across the United States has given impetus to plans for similar service in Europe. A three-engined mail plane is being prepared in London for regular service by night and day during the winter. The schedule will be so arranged that mail arriving during the night from provincial business centers will be transferred to the London air port and carried by special plane to Paris in time for delivery before noon.

Pending the introduction of the new schedule, the timetable of planes operated by Imperial Airways (Ltd.) has been changed to provide for winter service. One of the daily round-trip services between London and Paris will be dropped, the other two continuing. Two planes will leave for Cologne daily, one stopping at Brussels. The London-Zurich and London-Berlin services will be maintained; only one trip will be made on the Southampton-Channel ports route and one on the Ostend route.

Denver News

There was recently formed in Denver a chapter of the N.A.A., due mainly to the hard work of Capt. M. G. Robinson, who was elected president at the issuance of the charter. At the annual election of officers, Charles Alfred Johnson, one of Denver's prominent citizens, was elected president to serve for the coming year. On the Board of Directors are many leading citizens, and it is hoped that with this class of representation, aviation will make many strides in Denver in the near future.

Services in Germany and Baltic Regions

In general, the air services operating in Germany and the Baltic regions are on a summer schedule, flying only during the six months from April to October, inclusive. The planes carry registered and ordinary mail to all countries in which they are permitted to land, including Germany, Danzig, Lithuania, Latvia, Esthonia, Russia (including Siberia), and Persia. Services to Sweden and Finland were discontinued in the early fall, because of the withdrawal of government subsidies.

Berlin-Dresden-Furth Air Route Inaugurated

A direct aerial connection between Frankfort and Munich has been effected by the establisment of a new air service for passengers, mail, and freight between Berlin-Dresden-Fürth. This route forms an additional link in the already existing Baltic aerial system and trans-Europe Union System which connects the Danube countries and Switzerland.

No More Christiania—Oslo

The Norweigan government announces that the name of the capital of Norway, Christiana, will be known as Oslo after Jan. 1, 1925. Oslo was the name of the port and city prior to the Danish invasion several hundred years ago when the king Christian bestowed his own name upon the place.

Boyd Variable Camber Monoplane

The interesting particulars which are given below have just been received about the Boyd variable camber monoplane of which brief mention was previously made in these columns. A photograph of this ship appeared in our issue of Nov. 17, last.

Hunter Boyd of Washington, D. C. a member of the aerodynamics section of the Bureau of Standards, is the designer of the new type of plane, which was tested recently at Bolling Field and proved entirely successful.

Employing a variable camber wing and discarding the usual wing tip ailerons, the Washington inventor has devised a plan by which the entire rear edge of the wing is hinged. These flaps act as ailerons for lateral control, while at the same time an ingenious arrangement of the joy stick mechanism permits both ailerons to be raised or lowered at the same time. This operation is performed by means of a strap which is within easy reach of the pilot, and can be readily carried out while the machine is in the air. It interferes in no way with the balancing of the plane.

The variable camber wings control the change in speed, and permit the unusually low landing speed of 30 mi./hr. Tests of the new type plane showed it capable of a maximum speed of 110 mi./hr.

The design worked out by Mr. Boyd is based on information gained through experimental work at the Bureau of Standards. The inventor built the plane with the help of his father and brother who live in Baltimore, and before the test at Bolling Field the plane had been flown over from Baltimore, making the trip in 20 min. Lieut. Leo M. Willinger of the National Guard piloted the plane in the test flight, which was witnessed by Comdr. H. C. Richardson of the Navy and by members of the staff at Bolling Field and aerodynamic experts of the Bureau of Standards.

The plane has accommodations for three persons, but requires an 80 hp. engine to carry that load. In the test it was flown with a 45 hp. Anzani engine turning at 1450 r.p.m. and carried only the pilot. The frame is of ash and the covering of sheet duralumin.

In addition to the variable wing structure, the lift of the wings, instead of being carried by the fuselage, as in the ordinary plane, is transmitted to the landing gear by streamlined spars attached near the middle of the length. Whether in flight or on the ground, the landing gear carries the load. The wings themselves are made quite thick in the middle and become thin at the fuselage and at the tips.

The pilot's seat is so placed that when in flight his head comes on a level with the wings and the openings in the fuselage are so arranged that he can see over and through the wings with equal ease.

"Deruluft" Traffic, 1924

During the half-year May-October, 1924, the "Deruluft" (German-Russian Air Transport Co.) carried 397 passengers, 2½ tons of mail and 35 tons of freight on the Koenigsberg-Moscow airway. The service was temporarily stopped on Nov. 1 on account of weather conditions, but the company proposes to resume it shortly.

The company known as "Zakavio" (Trans-Caucasus Aviation) resumed its services between Tiflis and Baku on Sept. 18. On Sept. 19 a new service of the "Dobrolet" (volunteer air fleet) was opened between Sevastopol, Yalta, and Eupatoria.

London-Berlin-Koenigsberg Traffic

During the month of September a total of 52 planes were flown over the London-Berlin-Koenigsberg air route which is operated by the German-Russian Air Traffic Co., in connection with the air line of German Aero-Lloyd. These planes covered a distance of 62,400,000 km. carrying a total of 113 passengers, 565 kg. of mail, and 6,240 kg. of freight.

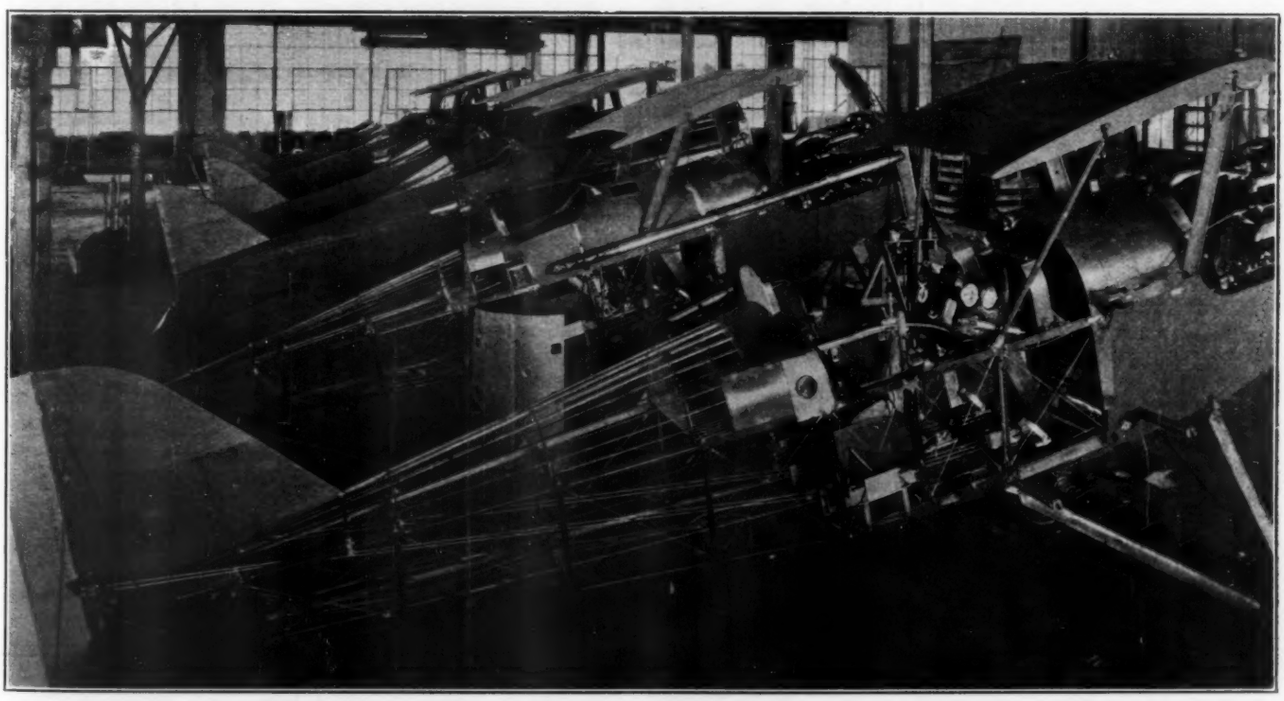
Paris-London Fare Reduced

The round trip air fare from Paris to London has been reduced from 800 to 700 francs (from about $42 to about $37). The distance is 240 mi.

An interesting feature of the passenger traffic at Le Bourget (Paris), is the fact that 58 per cent of the passengers carried during July, 1924, were Americans.

Sale of U. S. Air Mail Stamps Abroad

On recommendation of Americans resident in Paris, the sale of American air mail stamps in European countries is being considered. On arrival in the United States, incoming mail bearing such stamps could immediately be placed in special pouches for delivery via transcontinental air mail.



Final assembly line-up of SE5A pursuit planes recently manufactured by the Eberhart Steel Products Co. of Buffalo, N. Y., for the Army Air Service

Photos Kadel & Herbert

Observation plane squadrons of the Japanese air force, lined up for inspection during the recent general maneuvers of the Japanese army

Another Plane for General Patrick

The Repair Shops at the Fairfield Air Intermediate Depot, Ohio, are very busy these days. One of the pieces of work of which they are especially proud is the DeHaviland which is just being completed for General Patrick. The very finest material and workmanship has been put in it. It has a baggage compartment, two fully equipped instrument boards and many other improvements. The fuselage is finished in light blue, the surfaces have a clear finish and the radiator, wheels, streamline, etc., are given an aluminum finish. This plane has been assembled and will soon be ready for a flight test.

Army Air Orders

Orders 234 amended to relieve Maj. Harold Geiger, A.S., from duties in Berlin, Germany, effective Jan. 1, 1925.

First Lieut. Benjamin R. Morton, A.S., Off. Asst. Sec. War, Washington, to Bolling Field.

First Lieut. Thomas W. Blackburne, A.S., Selfridge Field, to Kelly Field.

Maj. Norman W. Peek, A.S., Akron, to duty with Org. Res. Fifth Corps Area.

Lieut. Mills Receives Gold Plaque

The Commanding Officer of Wilbur Wright Field, Fairfield, Ohio, recently assembled all of the officers at the Headquarters and presented to Lieut. H. H. Mills the plaque of solid gold, which symbolizes the Pulitzer Trophy. The plaque is the permanent possession of Lieut. Mills, but the trophy must be passed on to the next winner. Our Correspondent states that it is confidently expected that Lieut. Mills will win at least one race next year and add another gold trophy to his possessions.

A. S. Contribution to Army Relief Fund

As a result of aerial exhibitions held at various Air Service fields and stations during the past summer and early fall for the benefit of the Army Relief Society, a net amount of $40,000 was realized, which was turned over by the Chief of Air Service to Mrs. Mabel W. Stimson, President of the Army Relief Society.

Officers to Train on the ZR3

Capt. C. P. Clark and Lieut. Karl S. Axtater, A.S., recently left their station, Scott Field, Ill., for Lakehurst, N. J., where they were ordered to take training on the ZR3.

U. S. NAVAL AVIATION

The Ocean Going Flying Boats

The two ocean-going flying boats construction of which was recently ordered by the Naval Bureau of Aeronautics, will probably be ready by next spring, Admiral Moffett testified before the Naval Appropriations Subcommittee of the House on Dec. 15. He said that these two flying boats "will have greater capabilities than any such plane possessed by any other nation," adding:

"It is confidently expected that these planes will be able to make a non-stop flight from San Francisco to Pearl Harbor carrying five persons and the necessary equipment. That means loaded for use, and we consider it extremely important if we can get a plane that will go to Honolulu under its own power, because if it can go there it can go further—it can go across the Pacific, the longest over-sea flight in the world, without help from ships."

It will be remembered that the contract for the construction of one of these flying boats, type PB, was awarded the Boeing Airplane Co. of Seattle, Wash. The other plane, PN9, will be built by the Naval Aircraft Factory at Philadelphia. Both planes will be equipped with two 700 hp. Packard model 2500 engines, arranged in tandem.

Navy Air Orders

Lieut. Comdr. Rufus A. Ferguson (MC), det. U.S.S. Savannah, to Naval Air Sta., Pensacola.

Lieut. Comdr. Harry Shaw (MC), det. Nav. Hosp., L. I., Phila., to Nav. Air Sta., Lakehurst.

Lieut. Guy. Push (MC), det. Nav. Med. Sch., Washington, to Nav. Air Sta., Anacostia.

Lieut. Leslie C. Stevens (MC), det. Naval Aircraft Factory, Phila., to U.S.S. Langley.

Orders detaching Lieut. (jg) John G. Burrow Nav. Air Sta., Pensacola, to U.S.S. MacLoish revoked.

Orders detaching Lieut. (jg) Joe E. Rucker, Nav. Air Sta., Pensacola, to U.S.S. Simpson, revoked.

Orders detaching Lieut. (jg) Dwight H. Wilson, Nav. Air Sta., Pensacola, to U.S.S. Meyer, revoked.

Explosive Catapult Launches Plane

The first airplane to be successfully shot from an explosive catapult on a battleship, according to naval officers, was shot into the air at a speed of 55 mi./hr. at Bremerton, Wash., Dec. 14, from the U.S.S. Mississippi.

Fourteen pounds of smokeless powder was used to shoot the airplane which was piloted by Lieut. L. C. Hayden and accompanied by W. M. Fellers, representative of the Navy Bureau of Aeronautics at Washington, from the forward turret of the battleship without a noticeable jerk or shock. Dummy weights were used in tests before the plane was released with its two passengers.

The plane used in this experiment, illustrated on this week's cover of AVIATION, was a Glenn L. Martin Model MO1 gun spotter, equipped with a 400 hp. Curtiss D12 engine, on which some minor changes were made for the experiment.

Short Wave Radio Successful

An illustration of the trend of development of aircraft radio by the Navy and the Marine Corps is contained in a report to the Navy Department from the Marine Flying Field, Quantico, Va., that stations in England and France, and ships at sea near the Equator have received signals from the short wave (88 meters) transmitter at that station. The receiving set at the station recently received two New Zealand stations, call letters Z4AA and Z2AC. In commenting on the reception of these stations, the report from Quantico states: "It is hoped before long to have direct communication with these stations and break our own 4,000 mi. record at communication, as reports on this station's signals from England and France are becoming commonplace."

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

Teaching Parachute Jumping

AVIATION has frequently had to report cases where the Irving Air Chute — the standard equipment of the Army Air Service — has proved its extreme utility. Occasions have arisen in the past where the lives of the occupants of an airplane became imperiled by reason of mechanical breakages or collisions in the air, rendering the plane unmanageable, or through motor failure over localities where it was impossible to make a safe landing, all of which would have culminated disastrously but for the fact that they had the good fortune to carry a parachute with them.

In order to familiarize its personnel with this emergency equipment the Air Service is giving instruction in parachute jumping at the A. S. Technical School, Chanute Field, Rantoul, Ill. Since March 1, 1921, the date the A. S. Technical School began instruction at Chanute Field, after transferring from Kelly Field, Tex., 15 officers and 72 enlisted men of the Air Service have been graduated and 26 members of the U. S. Navy and Marine Corps have completed successfully this course of instruction.

How this parachute course functions is described as follows in a recent issue of *Air Service News Letter.*

Graduates of the Parachute Course attain the consummation of their endeavors by a practical application of the instruction they have received, in making two parachute jumps, — the first a "pull off" from the wing, and the second a free or "live" jump from the cockpit of a Martin Bomber or DeHaviland airplane, simulating in so far as possible the actual conditions attendant on a catastrophe in the air in which the pilot or passenger must rely on their parachutes to reach the ground safely.

Let us assume that you are a member of a graduating class in parachutes. It is time for the take-off. One graduate is standing, facing the direction of flight, on each wing of the Martin Bomber with his double training parachute, which he has personally folded and packed, harnessed to his back and chest. He grasps a strut to maintain his position. You are in the cockpit similarly equipped for the "live" jump.

The roar of the exhaust. The plane trundles across the field slowly gaining flying speed. It rises, dips slightly, rises again and mounts higher and higher into the clear sky. When the desired altitude is reached, usually between 1500 or 2000 ft,. the parachute officer rises to his feet and holds out his arms. At this signal, the students on the wings prepare for the "pull off," one hand clutching a strut to steady themselves, the other clenched around the rip cord of their main chute. The motor is cut. The parachute officer drops his arms, and the students vigorously jerk their rip cords. The little pilot chutes swiftly appear, dragging after them the principal chutes, and off they go head-first and backward from the wings.

A sensation of bouyancy, for the plane leaves them apparently suspended in mid air; a feeling of arrested motion, similar to alighting on a gigantic heap of feathers, as the main chutes open above their heads. Now for the live jump!

One moment an immobile figure, a foot on the cowling. A dive and the next instant the ship is far above you. Earth and sky meet and recede in an indescribable jumble. You are falling with astonishing rapidity. A sharp, almost involuntary jerk of the rip cord; a sickening void as your fleeting passage through the air stops abruptly; an ecstacy of joy coursing through your being as you feel the secure support of your harness and see the immense cloud of snowy silk above, knowing that your work has been well done.

The curriculum of the Parachute Course of the Air Service Technical School comprises thirty hours of wire and metal work which is spent in making pack frames, rip cords and fittings for testing chutes; thirty hours of pack making and repair; thirty hours of harness making; sixty hours of folding and repair of the silken fabric and thirty hours of testing and jumping, making a total of 180 hours for the six week's course. Ten students compose a class, with four classes a year.

The student graduates thoroughly familiar with the three types of service chutes namely the Service Seat Pack for pilots and passengers; the Lap Pack for machine gunners and photographers and the Double Training Pack for the chest and back, used for jumping students or for exhibition purposes.

Aerial Photography School at Rantoul

There is but one school in this country where the student can obtain a comprehensive knowledge of aerial photography: this is the Department of Photography of the A. S. Technical School, Chanute Field, Ill., which has been in practical operation since July 1, 1922. It is conducted under the most advanced methods and so far ahead of printed publications that the latest editions are considered obsolete. With its efficient teaching personnel, comprising commissioned, enlisted and civilian instructors, the school has graduated, since the date above mentioned to the present time, 139 students classed as follows: Officers— U. S. Army Air Service, 10; A. S. Reserve Corps, 5; U. S. Marine Corps, 1; U. S. Navy, 1; Enlisted men, U. S. Army Air Service— General Photography, 105; Motion Pictures, 9; U. S. Marine Corps— General Photography, 8; Total— Officers, 17; Enlisted Men, 122.

The course for officers of the Regular Army lasts 38 weeks and for reserve corps or national guard officers, three months. These two courses cover in their scope all phases of the subject from a general study and demonstration of the fundamental principles involved in elementary photography, through photographic chemistry, mosaic making and photography to and including photographic interpretation or the last minute methods used in extracting military information from aerial photographs and in disseminating such intelligence. General photography for enlisted men of the Regular Army covers much the same ground, lasts sixteen weeks and produces a competent man in mosaics. The course for motion picture camera operators thoroughly familiarizes the graduate with those subjects pertaining to operation and maintenance of motion picture cameras and practical outdoor cinematography on the ground and from the air. Its duration is eight weeks.

These four courses, constituting the curricula of the Photographic School, are handled in so effective a manner that, unlike most graduates of an institution of learning, those who successfully complete their instruction are fit to practically apply the knowledge gained.

Chanute Field Starts Correspondence Course

The Chanute Field Branch, Corps Area Correspondence School, was established with an initial enrollment of 67 Reserve Officers — 57 Air Service, 8 Chaplains and 2 Medical Corp. Capt. Orlando J. Posey, M. C., has been designated instructor for the Medical students; Chaplain Futcher for the Chaplains, and Lieuts. J. J. Devery, Jr., Arthur J. Johnson and Harold G. Peterson for the Air Service officers.

Army Surgeons Witness Flying Exhibition

An aerial exhibition and review was recently held at Kelly Field, Tex., for the entertainment of the Convention of Army Surgeons in session at San Antonio. All sorts of air work was shown, including acrobatics, machine gunnery, bomb dropping, and formation flying.

Publisher's News Letter

The best news that has reached AVIATION in a long time has been a decision from the Secretary of War upholding our claim that it is improper for officers of the Air Service to run under the guise of a Service publication a magazine which is in reality a private venture intended to compete with others in the field.

The letter states:

"The Secretary of War has given careful consideration to your complaints against the magazine '*U. S. Air Services*'. This magazine is not a service publication, but is a private enterprise conducted by a corporation over which the Secretary of War has no authority. The Secretary is, therefore, unable to issue any orders to the publishing company.

"The Secretary of War has directed that no officer of the Army will use, or permit others to use, his name, title, prestige or official position to assist this magazine, or any other privately owned magazine, to obtain business. The Secretary of War trusts this action will remove any ground for just complaint against the Army in connection with the magazine in question.

"The Secretary of War has, however, authorized the Air Service to conduct a service publication along the lines of those conducted by the Infantry, Cavalry, Field Artillery, Coast Artillery and Corps of Engineers."

* * * *

Mr. Charles Grey, Editor of *The Aeroplane*, viewing this competition from the foreign point of view, wrote while here: "It is true that outside Bolshevik Russia, where everything nominally belongs to the State (barring the rake-off) no Service publication would be allowed to compete directly with a commercial enterprise as seems to be allowed by the American Service High Commands. But the fact that *U. S. Air Services* does exist, shows the way in which the Commanding Officers of the Army and Navy appreciate the sweet uses of advertisement."

A word or two in explanation may prove enlightening. An Air Service Association was started after the War, and what was supposed to be a Service publication begun. By using the initiation fees as well as the dues, the publication was kept going for a year or so, but it soon became apparent that the intention was to publish a general aviation magazine, to interest the public, and not a service publication. When Congress commenced to investigate the many publications that Services had started during the War, the officers running the magazine in question secured the advice of expert legal talent in one of the Departments and found a way to evade Congressional supervision, as well as that of the Secretary of War. The magazine was incorporated, $50,000 worth of stock was offered to the public, and the announcement was made that it was no longer a Service publication. About $10,000 worth of officers' time—not "out of office" time, but whole time by detail—had by then been spent in building up the magazine. At this point the complaint resolved itself into two parts. First, that the War Department should not build up a publication with government funds and then permit it to incorporate and to compete with privately owned publications. Second, that officers should not be permitted to use their official status to favor and direct a civilian magazine intended to compete with existing magazines.

The Secretary of War at that time directed officers holding stock in the publishing company to dispose of it, and stated that he did not look with favor on officers having anything to do with publications that dealt with War Department policies other than Service magazines.

* * * *

Then came the second period. The magazine now represented itself to advertisers and subscribers as a Service magazine. By every device known, it misrepresented its true status and until Representative Nelson on the floor of Congress told of its true character, there was a continuous campaign to give the impression that the publication was owned and run by officers. Aircraft constructors who were seeking large contracts were asked by officers to advertise, and whether or not they wished to use the publication for this purpose, decided that to do so would further their dealings in official circles. The boldness of these improprieties led to the complaint of AVIATION. As a result, the Inspector General of the Army made an exhaustive investigation, while the Judge Advocate General of the Army reviewed the legal aspects of the case. Finally a decision has been rendered which in every way supports our contention that it is improper for officers to use their "name, title, prestige or official position to assist this magazine, or any other privately owned magazine, to obtain business." Support which rightfully should have gone to the trade press has been diverted to this unofficial, and yet very official, publication. As the magazine was not under the expenses of other privately owned publications, it could produce much more elaborate issues than can be afforded by publications which have to be self-sustaining.

* * * *

The future action in regard to officers' connections with *U. S. Air Services* will be watched with great interest. The Lampert Committee that is investigating the Air Services has already started to probe the publishing activities of officers, and unless prompt and adequate measures are taken to correct the situation, more will be heard of this matter.

This rather involved publishing problem has been presented to our readers not so much to let them know of the difficulties under which AVIATION has labored but rather to give them a hope that AVIATION in 1925 may be able, relieved of unfair competition, to render greater service and give a larger volume and variety of reading matter than heretofore.—L.D.G.

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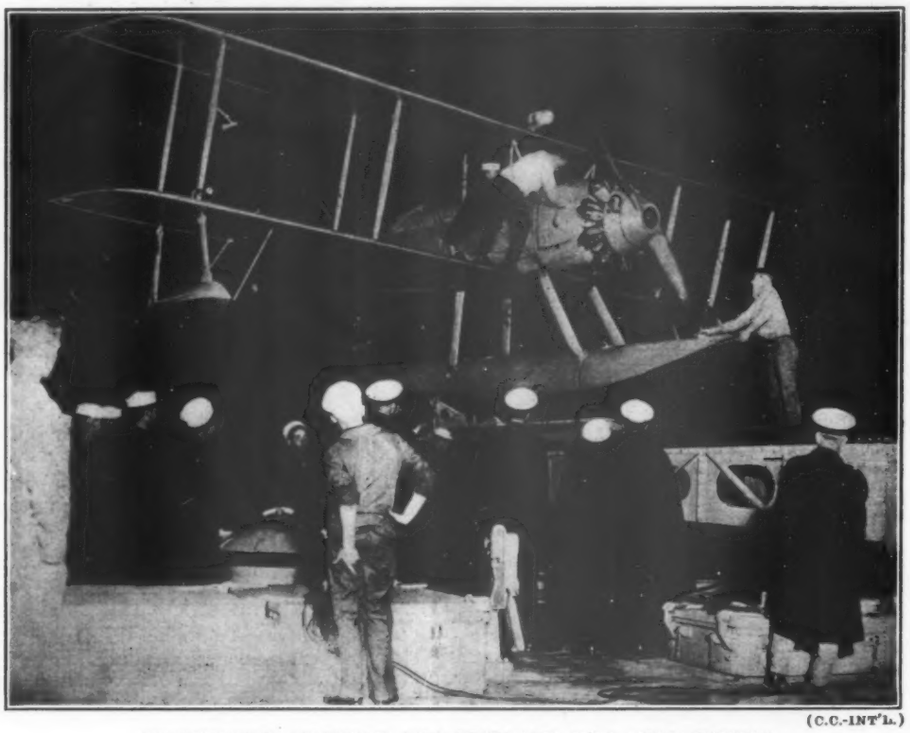
U. S. NAVAL AVIATION

(Continued)

The excellent results that have been obtained with this short wave equipment during the past year at various Naval and Marine Corps stations has resulted in experiments with a view toward the adoption of similar short wave, light weight equipment for aircraft. The first experimental set of this type for aircraft which was built by the Navy was installed on the rigid airship, the U.S.S. Shenandoah. A similar set is now being tried out in a DH4B type Navy plane. The extreme light weight of this type of equipment, combined with its extraordinarily long range, both for sending and receiving, makes it peculiarly well adapted for use in aircraft, where weight is a prime factor. The set on the Shenandoah sent messages during the transcontinental flight of last October that were received by vessels in the mid-Pacific and also by a New Zealand station, Z4AA, one of the stations whose signals have been received by Quantico. On Oct. 13 at 6 p. m. while the Shenandoah was moored to the mast at San Diego, Calif., Z4AA copied a message in code from the airship. The distance from San Diego to Palmerston, N. Z., the location of station Z4AA has been computed as slightly over 6,000 mi.

This short wave equipment on the Shenandoah was installed primarily for short range communication during mooring operations, between the airship and the mooring mast crew. Another feature of this equipment is that it operates on batteries, and draws only a very slight amount of current.

Aéroplanes VOUGHT



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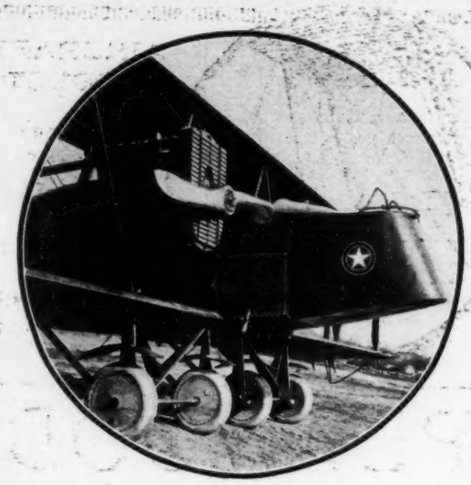

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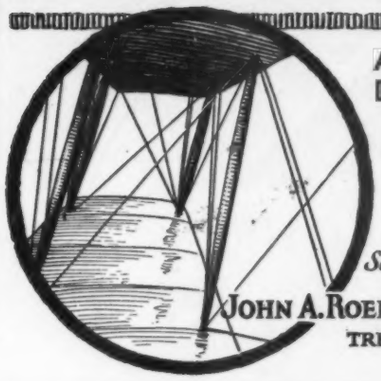

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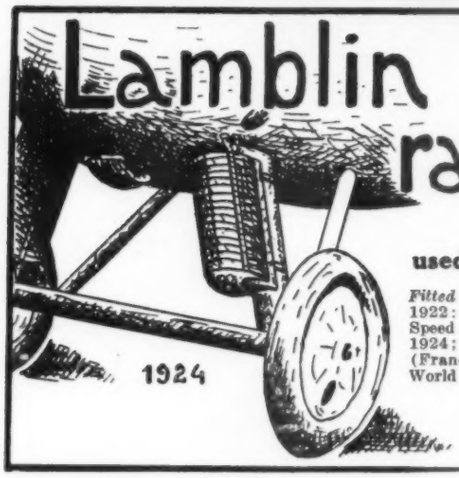

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GOODYEAR

AVIATION EQUIPMENT

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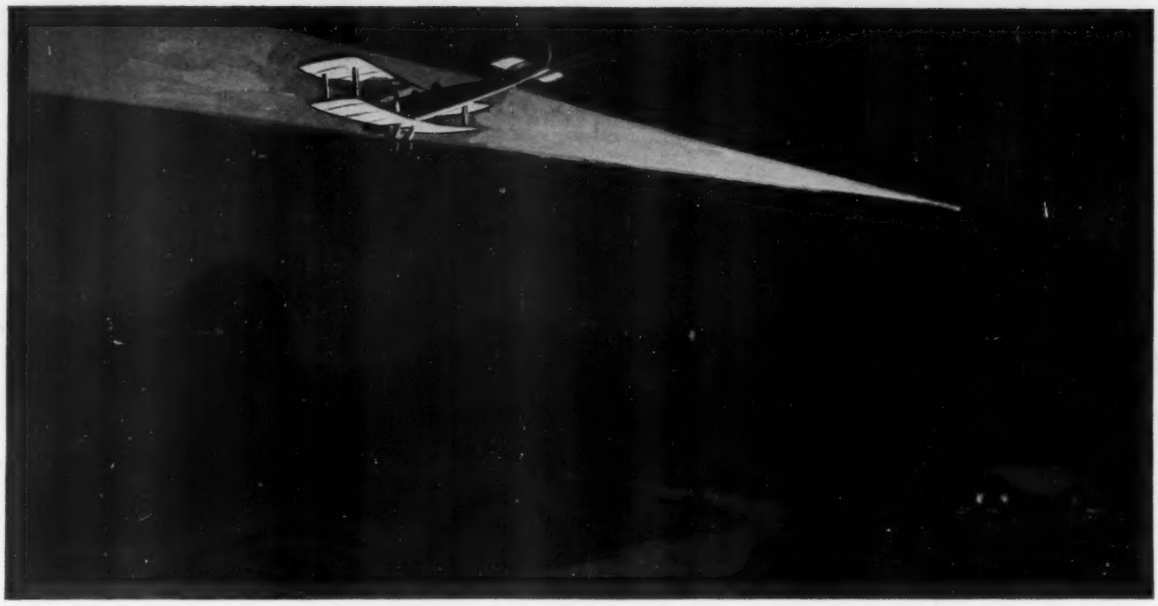

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